INDIA RUBBER WORLD

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JANUARY, 1949

SRF STERLING S

HMF STERLING L

Smooth-Out STERLING SO

Furnace Blacks for Bulk Handling

CABOT

GODFREY L. CABOT, INCORPORATED

• Write for our Engineering Department's study of Bulk Handling Systems

77 FRANKLIN STREET • BOSTON 10, MASS.

with Du Pont RPA's you can Reduce breakdown time Improve processability Cut power consumption

Tune in to Du Pont "Cavalcade of America," Monday Nights—NBC Coast to Coast

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

RPA #2

SOLID FORM

For natural rubber and reclaim

Supplied in the form of waxy flakes, is especially suited to open mill breakdown of natural rubber. Its use materially reduces the time and power required for breakdown. From 0.15 to 0.60 part per 100 parts of rubber is recommended, depending on the time and temperature of milling. RPA No. 2 also aids in producing smooth-processing reclaim stocks . . . is effective for reducing the viscosity of rubber cements.

RPA #3

LIQUID FORM

For natural rubber and reclaim

Preferred for peptizing natural rubber in a Banbury or plasticator because of its liquid form. With this peptizer, it is often possible to eliminate the second pass usually required when plasticating by mechanical means alone. The recommended amounts are the same as for RPA No. 2. It also helps produce smooth-processing reclaim stocks and aids in reducing the viscosity of rubber cements.

In reclaiming, 0.15 to 1.0 per cent RPA No. 3 (based on the scrap) may reduce the time required to produce a pan process reclaim by as much as 50 per cent. The time required to produce alkali reclaims may also be reduced through the use of RPA No. 3, although a slight modification of the process is necessary

RPA #5

LIQUID FORM

For GR-S

Especially developed for breaking down GR-S. Its use effectively reduces breakdown time and power consumption . . . helps produce smoother processing stocks with reduced nerve and shrinkage. From 0.5 to 2.0 per cent RPA No. 5 is recommended for breakdown at high temperatures on a mill, or in a Banbury or plasticator.

• • •

For sample and additional information on Du Pont Rubber Peptizing Agents, write: E. I. du Pont de Nemours & Company (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

India Rubber World, January, 1949, Vol. 119, No. 4. Published Monthly by Bill Brothers Publishing Corp., Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second-Class Matter at the Post Office at Orange, Conn., under the act of March 3,1879. Subscription United States and Mexico, $3.00 per year; Canada, $4.00, All Other Countries, $5.00; Single Copies 35 cents. Address Mail to New York Office.

To serve you in new ways . . .

another EASY PROCESSING AMERICAN RUBBER

HYCAR OR-15 EP

THE new *easy processing* Hycar rubber has superior processing characteristics that parallel those of the widely used Hycar OR-25 EP. It retains the properties of the regular process Hycar OR-15 . . . permanent resiliency and superior resistance to oil, abrasion and aging.

In addition, Hycar OR-15 EP has these basic advantages:

1. Designed for Banbury and high temperature mixing.
2. Cuts mill mixing time appreciably.
3. Less rejections due to better mold flow and fusion during cure.
4. Improved building tack for laminated products such as rolls, sheet packing and hose.

Ask your supplier to tell you about, or investigate the merits of new Hycar OR-15 EP. Or, please write to Dept. HA-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U. S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Philalethist—*Lover of truth.*

Philblack A—*The HMF black that weighs the evidence of smooth properties.*

We swear to tell the truth and nothing but the truth! This high-quality HMF black, Philblack A, has proved eminently successful in the manufacture of tires and other rubber goods. It not only makes processing easy, it also aids in obtaining smooth, facile extrusions.

Other important facts in this case . . . Philblack A gives rubber excellent resistance to abrasion, and to cut and crack growth, too. Verdict . . . Philblack A is, in every way, worthy of your trust. Try this HMF black yourself.

PHILLIPS PETROLEUM COMPANY

Phillips 66

Rubber Chemicals Division

EVANS BUILDING · AKRON 8, OHIO

WORLD

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Leader in the field of Chemicals for the Rubber Industry IN 1949

Naugatuck Chemical offers a complete line of

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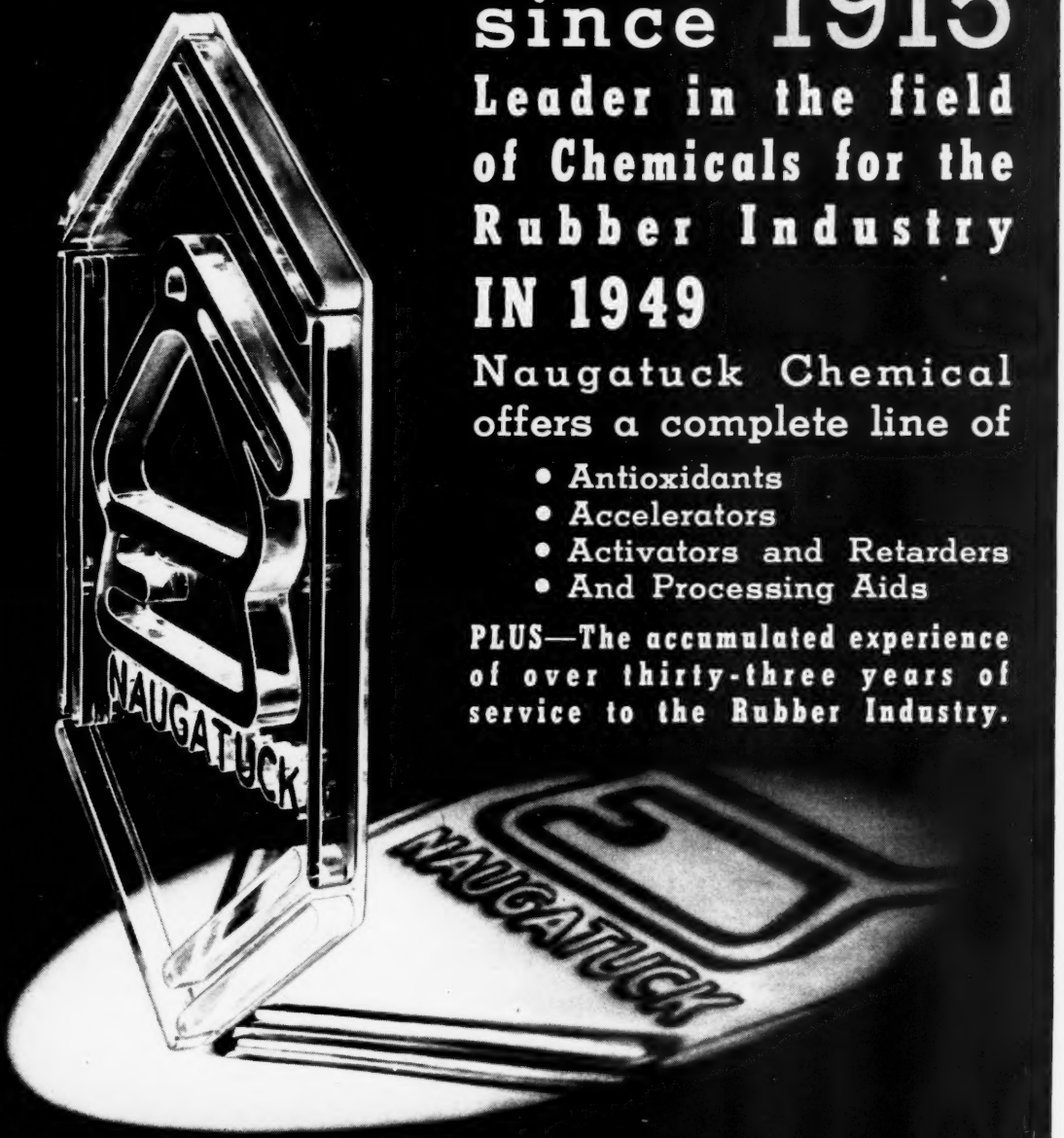
PLUS—The accumulated experience of over thirty-three years of service to the Rubber Industry.



process • accelerate • protect with naugatuck chemicals

NAUGATUCK CHEMICAL

Division of United States Rubber Company

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IN CANADA: *Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.*

A-C'S *BUYING GUIDE TO . . .*

GUARANTEED NEW AND REBUILT INDUSTRIAL ELECTRICAL EQUIPMENT

AUTHORIZED

DEALER

A. C. SQUIRREL CAGE MOTORS, 220/440 v., 3 ph. 60 cy. (New except where shown as "R & G")

QU.	HP	RPM	MAKE	DESCRIPTION
1	150	1750	Al. Ch.	R & G
1	150	600	WSTG.	CCL-R & G
1	125	1760	Al. Ch.	
1	125	1170	Al. Ch.	626 DS, SB
1	125	900	Al. Ch.	626 F
1	100	1760	Al. Ch.	623 AS, SB
2	100	1170	Al. Ch.	623 E
1	100	900	Al. Ch.	626 E, SB
1	100	720	WSTG.	CCL, 220 V, R & G
2	75	3500	Al. Ch.	4458, R & G
1	75	1750	Al. Ch.	505S, SB
1	75	1200	Al. Ch.	505, SB
1	60	1750	Al. Ch.	444S
1	60	1750	Al. Ch.	SB, R & G
1	50	3450	Ideal	A 120
6	50	1750	Al. Ch.	445
2	50	1200	Rel.	445
1	50	900	Al. Ch.	505

Complete ratings open. Totally Enclosed, and Explosion-Proof available below HP ratings listed.

D. C. ADJUSTABLE SPEED MOTORS, 230 VOLTS (Reconditioned & Guaranteed)

QU.	HP	RPM	MAKE	DESCRIPTION
7	15 20	400 1200	G.E.	CD105
3	7½ 10	450 1800	G.E.	CD85
4	10 15	400 1600	G.E.	CD95
3	40 50	250 1500	G.E.	CD1441
2	50 60	300 900	E-D	30S
4	60 75	450 1800	G.E.	CD1441
1	135 175	450 1200	G.E.	MCF
1	200	300 900	Wstg.	

D. C. CONSTANT SPEED MOTORS, 230 volts (Reconditioned and guaranteed except where shown "New")

5	5	340 534	G.E.	CD93
13	3	850 1700	Rel.	23T
1	30	850	Rel.	New
1	75	1330 1760	Rel.	385T

D. C. GENERATORS (Reconditioned and Guaranteed)

QU.	KW	RPM	MAKE	DESCRIPTION
5	20	1200	G.E.	CD93
2	75	1200	C-W	53H
1	30	1200	G.E.	CD113
9	5	1200	Rel.	23T

SLIP RING AND SYNCHRONOUS MOTORS

(Reconditioned & Guaranteed)

1 — 106 KW, 1200 RPM Electric Machinery synchronous generator, 80% PF, 220/440-3-60, single bearing.

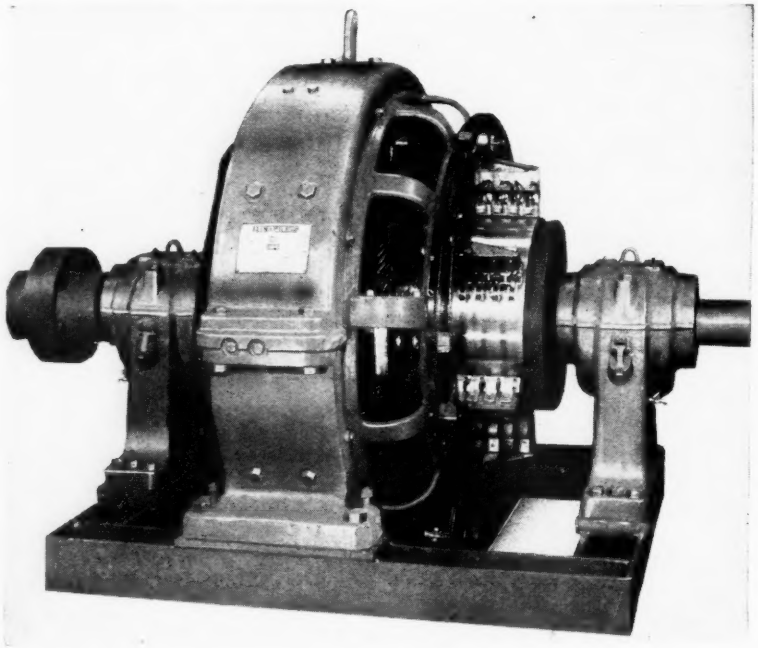
1 — 125 HP, 277 RPM, General Electric synchronous motor, 100% AF, 220 440-3-60.

1 — 250 HP, 600 RPM, 2200 volt, 3 ph., 60 cy. Lincoln IXY slip ring motor.

2 — 50 HP 900 RPM, 220 440-3-60 Louis Allis slip-ring motors, frame 505, Type GH, complete with fully magnetic control and resistance bank, like new.

MOTOR GENERATOR SETS (Reconditioned and Guaranteed)

QU.	KW.	D.C. VOLTS	A.C. VOLTS
25	3	250	220 440-3-60
5	5	250	220 440-3-60
1	30	125	220 440-3-60 (new)
1	60	125	220 440-3-60 (syn)
2	75	250	220 440-3-60
1	100	125 250	220 440-3-60
1	100	250	220 440-3-60 (syn)
1	125	250	230-3-60
1	150	250	220-3-60



CONTROLS (NEW)

QU.	SIZE	MFG.	VOLTS	TYPE
18	1	C-H	220-440-550	Combination
28	2	C-H	220-440-550	Combination
20	3	Clark	440-550	Combination
3	4	C-H	440	Combination
25	2	C-H	220-440	Reversing
3	3	Sq. D	440	Reversing
4	4	C-H	440	Reversing

REDUCED VOLTAGE STARTERS

QU.	HP	MFG.	VOLTS	TYPE
14	15	C-H, G.E.	220-440	R & G
6	25	C-H	220	Primary Resistor—New
11	50	C-H	220-440	New and R & G
4	75	C-H	220	New
3	100	C-H	440	New
4	125	C-H	220	New
2	150	C-H	440	New
2	125	C-H	440	Primary Resistor—New

MISCELLANEOUS

1 — New Robbins & Myers 5000 lb. Type S 3 BG Hoist, complete with hand geared trolley and totally enclosed motor, lifting speed 32 FPM, pendant rope control.

1 — Chandesson 5000 amp., 6 volt plating generator set with complete control, synchronous motor drive, 440-3-60.

1 — 60 KW, 1500 amp., Anodizing M-G Set, 3/40 volts, any A C voltage, 3 ph., 60 cy. squirrel cage drive.

1 — Electro-Products 120 KW, 3000 amp. Anodizing M-G Set, 3/40 volts, with complete control and synchronous motor drive.

SPECIALIZING IN ELECTRICAL PROBLEMS OF THE RUBBER, METAL PROCESSING & MINING INDUSTRIES

The A-C SUPPLY Co.

Plant and Office
Cuyahoga Falls, O.

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Effective January 1, 1949

the

INDOIL CHEMICAL COMPANY

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will take over the personnel and sales activities of the Chemical Products Department of the parent Company. This move will permit more efficient handling of our chemical business on a nation-wide basis.

INDONEX Plasticizers
INDOPOL Polybutenes
INDOCENE Aromatics
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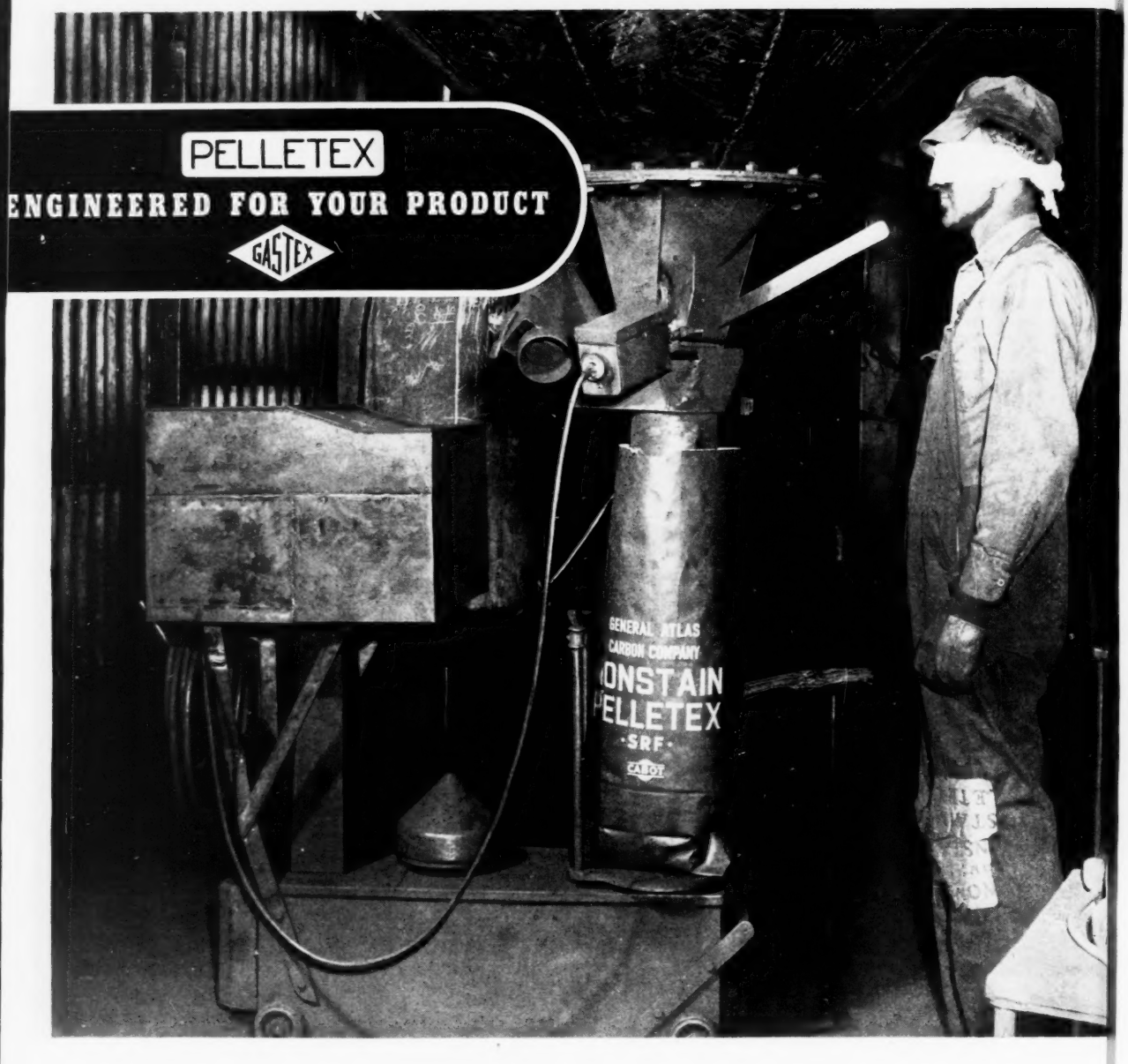
INDOIL Sulfonates and other
INDOIL Chemical Products

We take this opportunity of expressing appreciation of our past pleasant relations, and our hope of expanded but equally pleasant future relations.

INDOIL CHEMICAL COMPANY
910 South Michigan Avenue
Chicago 80, Illinois



Automatically Accurate to 1 Ounce in 50 Pounds

General Atlas "engineering know-how" extends beyond the manufacture of carbon black. The precision weighing of Pelletex is a good example. Pelletex bag weights are unfailingly accurate because General Atlas uses automatic electric eye control, eliminating human error. Just one of many technical controls where General Atlas "engineering know-how" assures a uniform product.

CABOT **The GENERAL ATLAS Carbon Co.**

77 FRANKLIN STREET, BOSTON 10, MASS.

Herron Bros. & Meyer Inc., New York and Akron • Herron & Meyer of Chicago, Chicago • Raw Materials Company, Boston • H. N. Richards Company, Trenton
The B. E. Dougherty Company, Los Angeles and San Francisco • Harrisons & Crosfield (Canada), Ltd., Toronto and Montreal

STABILITY . . . Marvinol VR-10 is superior in resistance to heat, light and other normally destructive factors.

VERSATILITY . . . Marvinol VR-10 is easy to process . . . may be calendered, extruded, injection molded, used in non-aqueous dispersions, formulated as unplasticized rigids . . . uniquely versatile.

TOUGHNESS . . . Marvinol's high molecular weight offers you extra toughness and "dryness" with long life . . . resists tear, wear, oils, acids.

. . . here's why industry is turning to MARVINOL® the unique VINYL RESIN

WIDER TEMPERATURE RANGE . . . Marvinol VR-10 assures you products that show less deformation due to heat . . . gives greater low temperature flexibility.

COLOR . . . Marvinol offers many opportunities for distinctive coloring . . . from clear to delicate or brilliant shades.

EASILY CLEANED . . . Marvinol-based products are easily and quickly cleaned because of their smooth surface. They're waterproofed, unaffected by mold or fungi.

The New Ultra-Modern Marvinol Plant contains the latest equipment to assure efficient operation, uniform production of the highest quality. Send today for details. Write on your company letterhead to Chemicals Division, Dept. I-1, The Glenn L. Martin Company, Baltimore 3, Maryland.

CLOSE COOPERATION . . . The Glenn L. Martin Co. compounds and fabricates only in its customer service laboratory for your benefit. We sell only raw materials. Our sales engineers and modern customer research laboratory are ready to help with your processing problems.

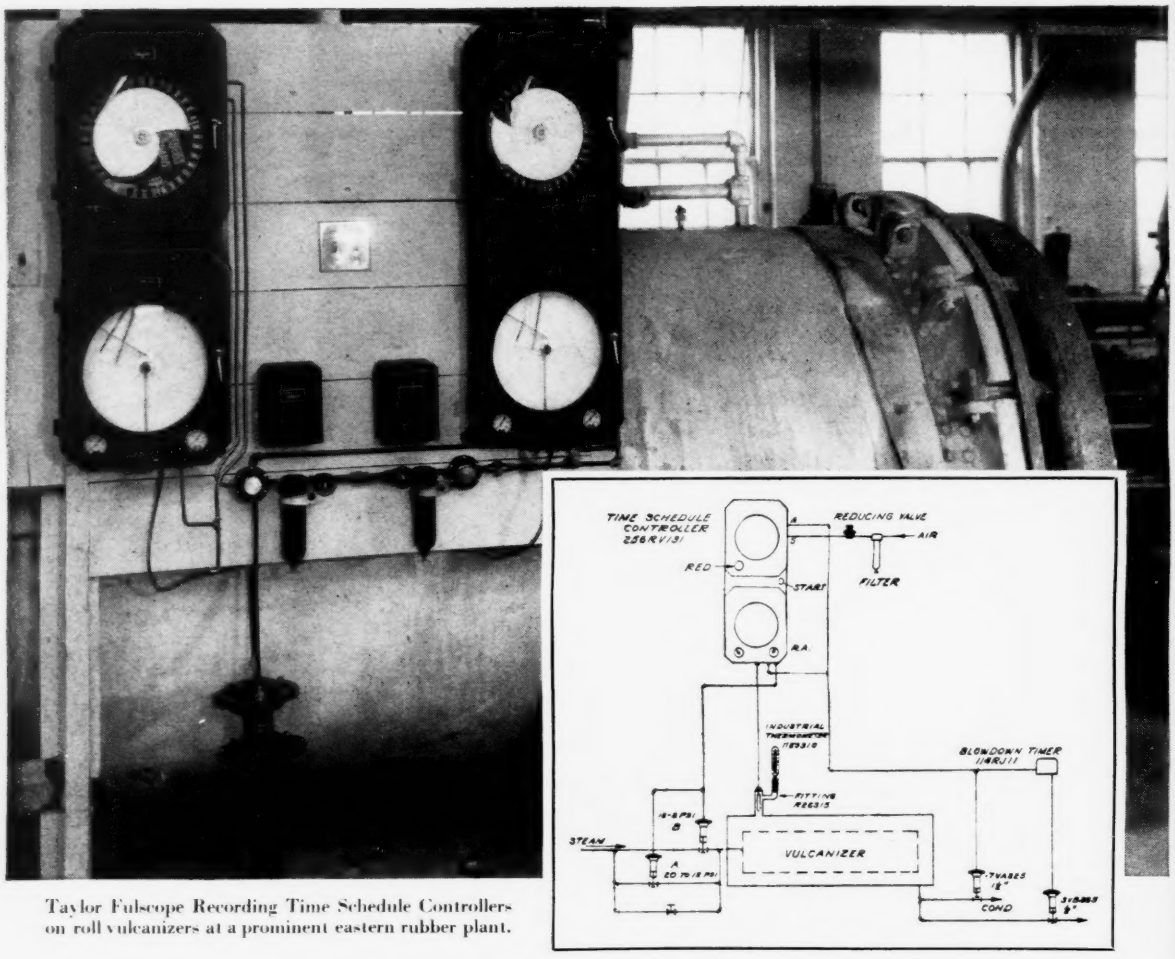
Martin ® Marvinol

RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF

THE GLENN L. MARTIN COMPANY • AN INTERNATIONAL INSTITUTION

"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN"

For perfectly cured rubber rolls Install these accurate controls!



Taylor Fulscope Recording Time Schedule Controllers on roll vulcanizers at a prominent eastern rubber plant.

HERE is a battery of Taylor-controlled roll vulcanizers recently installed for a leading maker of rubber coated metal rolls. Each is masterminded by a Taylor Fulscope Recording Time Schedule Controller (two shown) which delivers a consistently uniform product by automatically holding the same temperature *both inside and outside* the roll during each cycle.

Here's what happens once the operator pushes a start button:

1. Air admitted to Time Schedule Controller and Blow-down Timer.
2. Steam valves admit steam to vulcanizer and inside rolls to be cured.
3. Time Schedule Controller completely and automatically regulates rate of rise and cure temperatures.
4. Blow-down Timer automatically controls removal of condensate from vulcanizer.
5. At end of cure steam valves are closed. Blow-down valve opens and condensate valve closes.
6. Time Schedule Controller stops automatically with cam and trip units in start position for beginning of next cycle.

IMPORTANT: Interrupter timers built into each Time Schedule Controller make it possible to change rate of rise and cure periods without cutting new cams.

This is another example of how accurate Taylor control is helping makers of rubber and rubberized products keep quality up and costs down. Ask your Taylor Field Engineer how we can help *you*. Or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

▼ ▼ ▼

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

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R S T
WORLD

CARBON BLACKS

UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

View of elevators and storage for bag packing in one of our furnace units at Ryus, Kansas.

Why, Of Course!

A number of your compounds would be better if they contained more Kosmos 20, the semi-reinforcing (SRF) furnace black, and, furthermore, you would have an added advantage in processing. Therefore, for maximum efficiency use Kosmos 20 in more of your compounds.

Standardize on United carbon blacks. Their uniformity and high quality will contribute to the excellence of your products.

KOSMOS 20

RESEARCH DIVISION

UNITED CARBON COMPANY, INC

Charleston 27, West Virginia

POST-WAR PRESS *Sensation!*

Low-Cost ELMES HYDROLAIRS Now Deliver a Continuous Power Stroke

Here's a *welcome improvement* in small hydraulic presses—continuous power stroke that maintains the pressure you select . . . even on *compressible* materials. And when you add to this the many other Hydrolair advantages—small size; light weight; effortless operation, with your regular shop air line furnishing the power—you've *really* got something good.

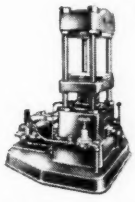
NO OTHER PRESS LIKE THIS

Hydrolairs have *neither* pumps nor motors. The amazing new Elmes Power-petuator automatically transforms air-line pressure into *positive* hydraulic force. Packless construction assures freedom from maintenance. *Hundreds already in use.*

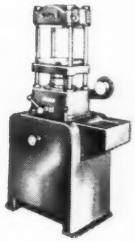
EASY TO BUY • EASY TO USE

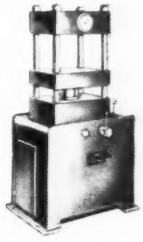
Hydrolairs are as economical *to buy* as they are to use. The 30-ton bench-type sells for only $865.00; the 30-ton floor-type for $1085.00; and the 50-ton floor-type for $1900.00—f.o.b. Chicago. Hot plates and other accessories, extra. Ask for Bulletin 1036A *today.* Elmes Engineering Works of American Steel Foundries, 232 N. Morgan St., Chicago 7.

Bench- and Floor-Types Capacities to 50 Tons



Power-petuator, shown at rear of press, is enclosed in base of floor-types.





30-TON BENCH-TYPE

Opening, 0" to 13". Platen, 10" x 10". Stroke, 6". Dimensions, 30" x 29" x 47" high. Shipping weight, 980 lbs.

30-TON FLOOR-TYPE

Opening, 0" to 13". Platen, 10" x 10". Stroke, 6". Dimensions, 36½" x 19" x 65" high. Shipping Weight, 1325 lbs.

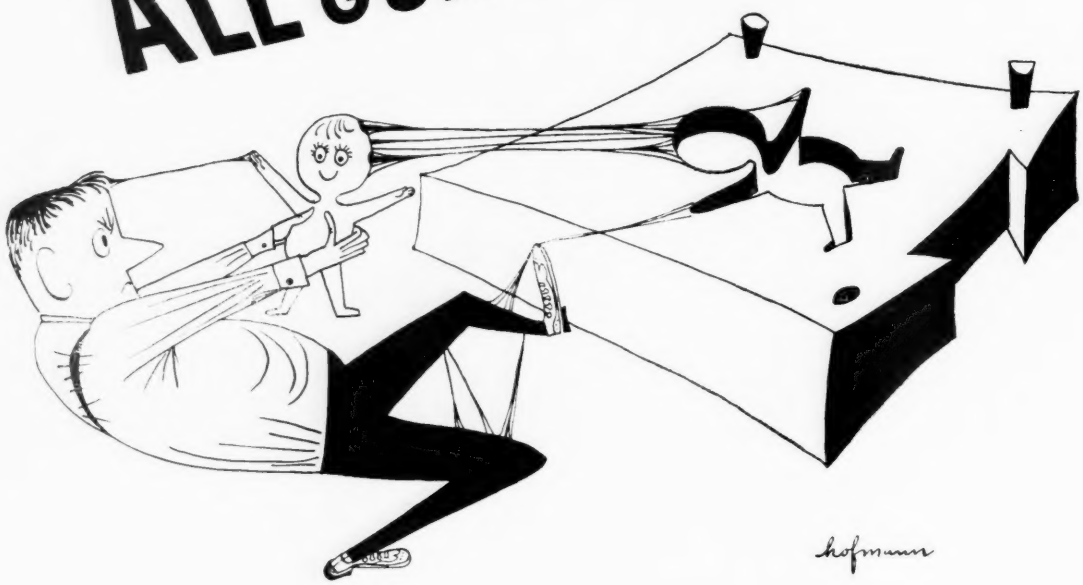
50-TON FLOOR-TYPE

Opening, 14". Platen 18" x 18". Stroke, 6". Dimens. 40" x 27" x 65". Ship. Wt., 2400 lbs. Push-button control, optional.

ENGINEERED BY ELMES

Good Hydraulic Production Equipment Since 1851

ALL GUMMED UP?



Change to G-E Silicone Mold Release Agents

There's no sticky deposit to gum up your molds when you use General Electric silicone mold lubricants! They save time, reduce rejects. These new oils and water-diluted emulsions have a low surface tension, easily wetting the surfaces and crevices of the molds. Thus their faster, smoother release shortens "down time," decreases damage and scratching of molded rubber parts. One application of General Electric silicone mold lubricant is effective through several molding cycles. The mold does not have to be cleaned after each cycle. And rubber molders tell us that in some instances, G-E silicone mold release agents help them to get a better flow of material into all parts of the molds.

For improved production, order General Electric silicone oil =9981 LTNV-70 (low viscosity), =81092 (high viscosity), silicone emulsion =81024 (75% silicone), or =81099 (35% silicone) in any quantity from pints to drums. Quick delivery. Write for additional details. Section 40-1, Chemical Department, General Electric Company, Pittsfield, Mass.

SILICONES for Industry

GENERAL ELECTRIC

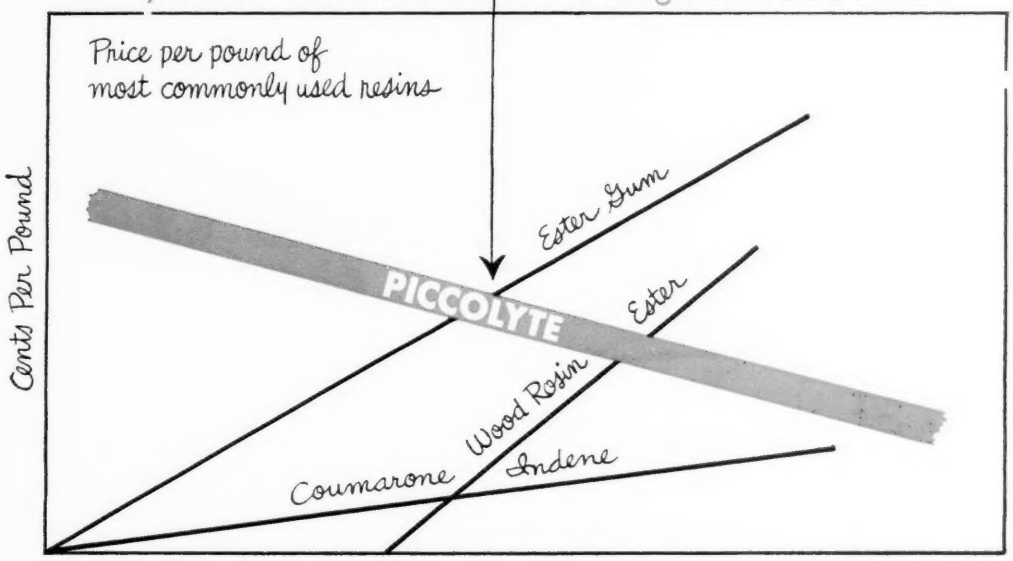
CD49-F1

Piccolyte

the Versatile Resin

costs less today than ever before

If you require a light colored, low molecular weight softener of hydrocarbon nature . . . investigate PICCOLYTE!



Ideal for EXTENDING, TACKIFYING, CEMENTING

ECONOMICAL. In addition to its low cost per pound, Piccolyte is soluble in low-cost naphthas in all proportions (an important additional source of savings)—as well as in many other solvents.

PALE COLOR, NON-YELLOWING. These very pale, pure hydrocarbon products do not become yellow, but retain their pale color.

PROPERTIES. Piccolyte is a thermoplastic terpene resin, compatible with plantation rubber, many synthetic types including polybutene, and other compounding materials. It is stable, neutral, inert, free from toxicity. Made in nine melting points, from 10° to 125° C. Precision manufacturing control assures dependable uniformity of quality.

Write for free sample of Piccolyte, and complete details, given in the new bulletin. Use the coupon.

PENNSYLVANIA
INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PA.

Pennsylvania Industrial Chemical Corp.
Clairton, Pennsylvania

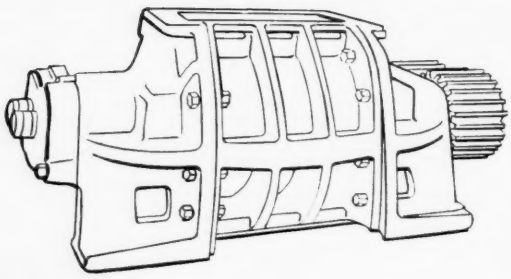
Please send me a free sample of Piccolyte, and your new bulletin. I wish to investigate Piccolyte for (application) .....

Name .....

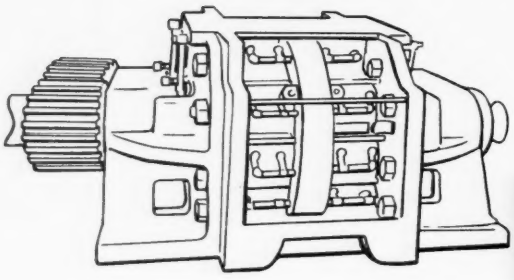
Company .....

Address .....

(IRW)



For *Longer* Service



From Your *Rebuilt* BANBURY

Available For Immediate Shipment —

Spare parts for Banbury bodies.

Available For Quick Interchange —

Completely rebuilt #9 Banbury bodies, spray or jacketed.

MANY Rubber Plant executives have for years entrusted *all* Banbury body rebuilding to us —some were our earliest customers, nearly 15 years ago.

Such confidence is *earned* only:— earned by efficient results and thorough dependability:— earned because an Interstate-rebuilt Banbury serves long and well:— earned because Interstate Service saves time, trouble, and money.

Our engineers know the requirements of every part of the Banbury Mixer through these long years of SPECIALIZED Banbury experience.

They know how to rebuild worn Banbury bodies to give highest mixing efficiency over longer periods of sustained operation.

Call on us for fast aid to *your* ailing Banburys. We are right in the heart of the Rubber Industry.

SERVING THE RUBBER INDUSTRY

INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

FOR ALL RUBBER and PLASTICS

STANTONE MASTERBATCH Colors

- ASSURE UNIFORM COLORING
- GREATER COMPOUNDING EFFICIENCY
- MORE ECONOMY

STANTONE MASTERBATCH COLORS give you concentrated color in a thermo-plastic medium quickly compatible in any rubber or plastic compound . . . Colors for clear transparency in plastic films or sheets, or for opaque compounds of rubber or plastic can be matched with certainty by precise MASTERBATCH formulations year-in and year-out . . . This means complete absence of color variations in finished products . . . Mills may be changed from one color to another without intermediate cleaning, for STANTONE MASTERBATCH COLORS are always clean to handle and clean to run.

Many manufacturers have adopted STANTONE COLORS for better coloring, greater compounding efficiency, and more economy . . . There is a complete range in MASTERBATCH form, also in dry pigment, or pulp form for latex.

HARWICK STANDARD CHEMICAL CO.

AKRON 8, OHIO

BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

WRITE FOR COMPLETE DATA ON COLOR COMPOUNDING WITH STANTONE COLORS!

Stymied by high material and labor costs?

NEW NRM TUBERS CAN CHANGE YOUR PROFIT PICTURE

Check your Equipment Against NRM's Modern Specifications

STANDARD SPECIFICATIONS NRM HEAVY DUTY TUBERS

(8 Models—2" to 12" Production Sizes)

Heads—In all production sizes, cylinder adapter heads designed for water cooling are available.

Screws—Machine-finished on special NRM equipment from special, high grade forged steel. Flight surfaces hardened by exclusive NRM process to assure long life. Long rear extension holds screw in alignment.

Cylinders—Heavy cast iron, water jacketed, with removable spiral sleeve equipped with special hardened alloy steel liner.

Hoppers—Conveniently designed for either hand or mechanical feeding.

Manifolds—Integral type, equipped with valves for heating and cooling as required.

Stress Rods—Heavy duty type for holding head and cylinder in alignment with gear housing.

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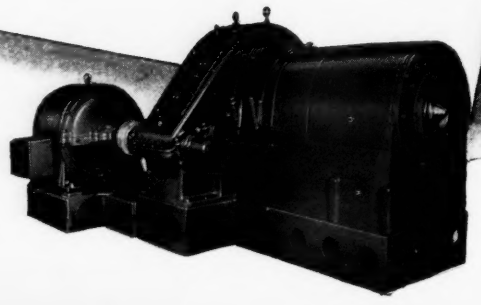

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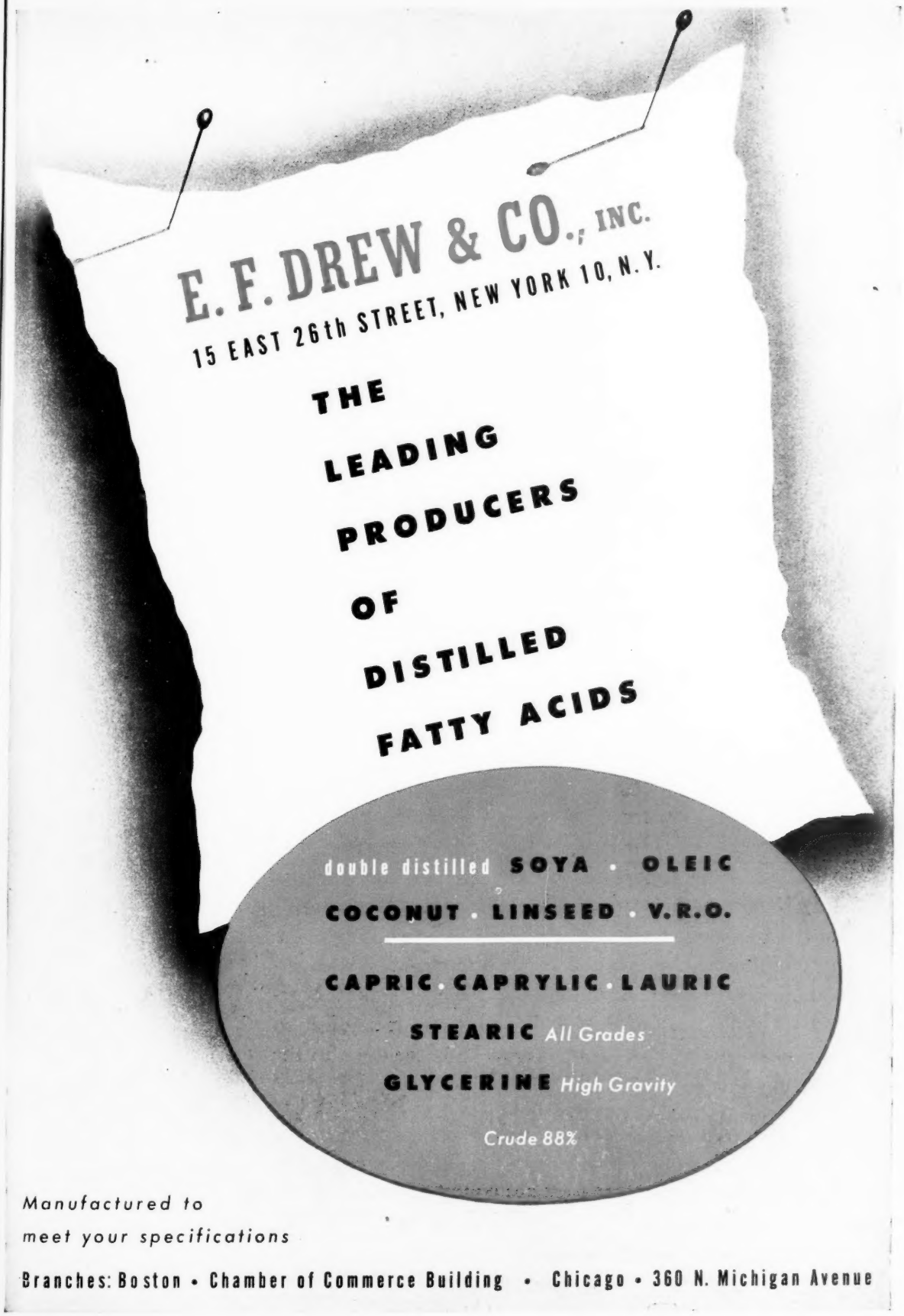
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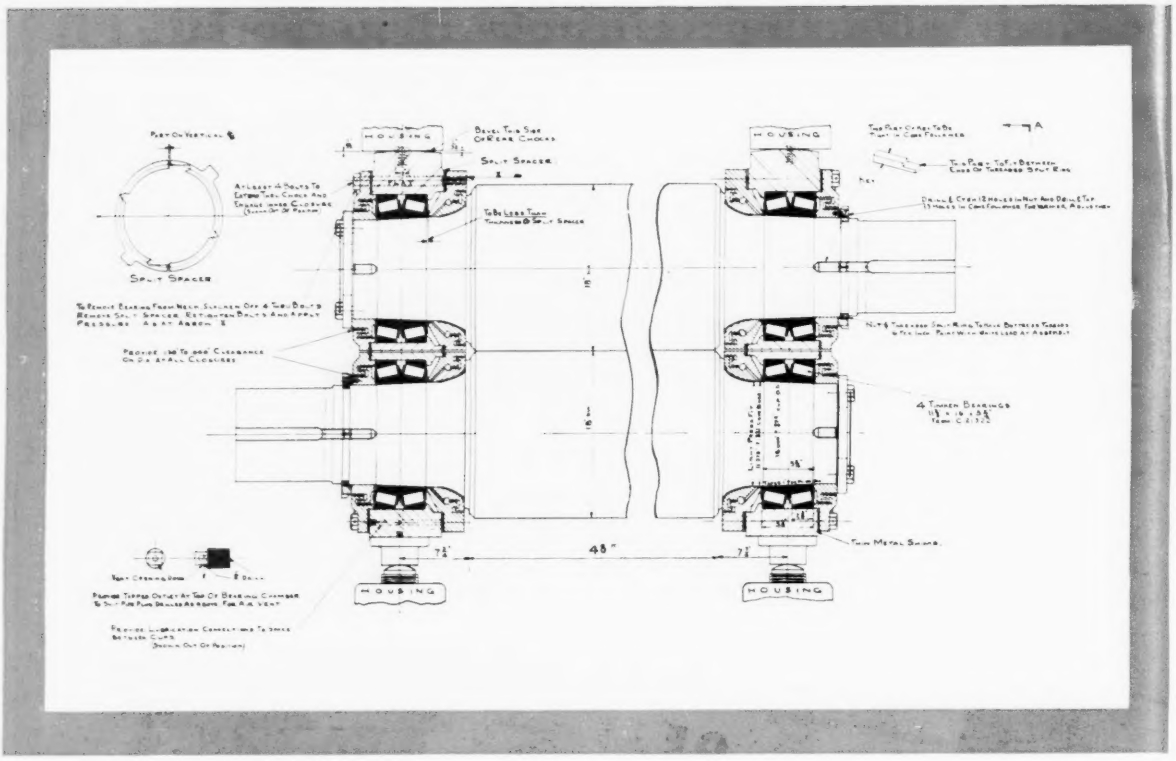

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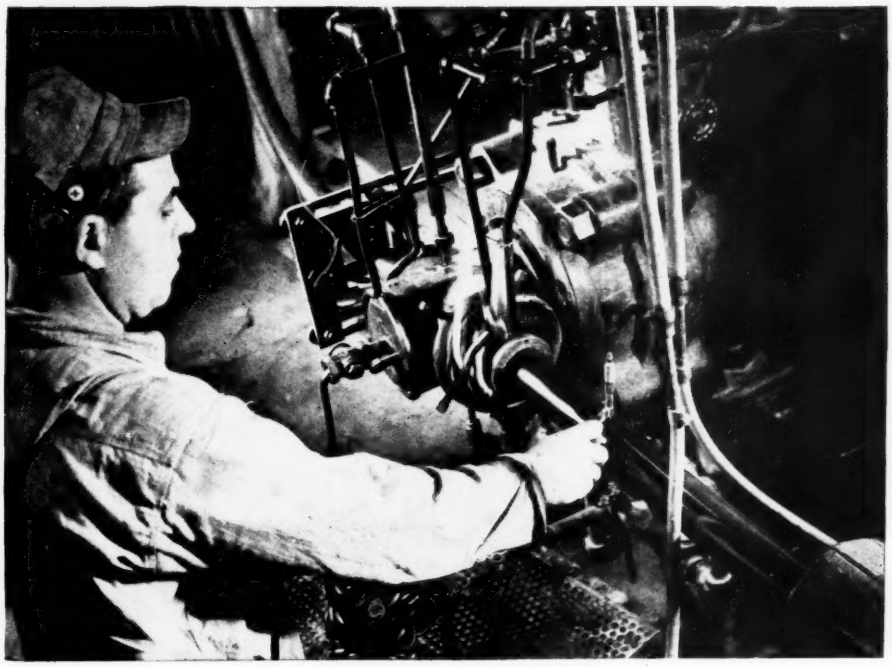

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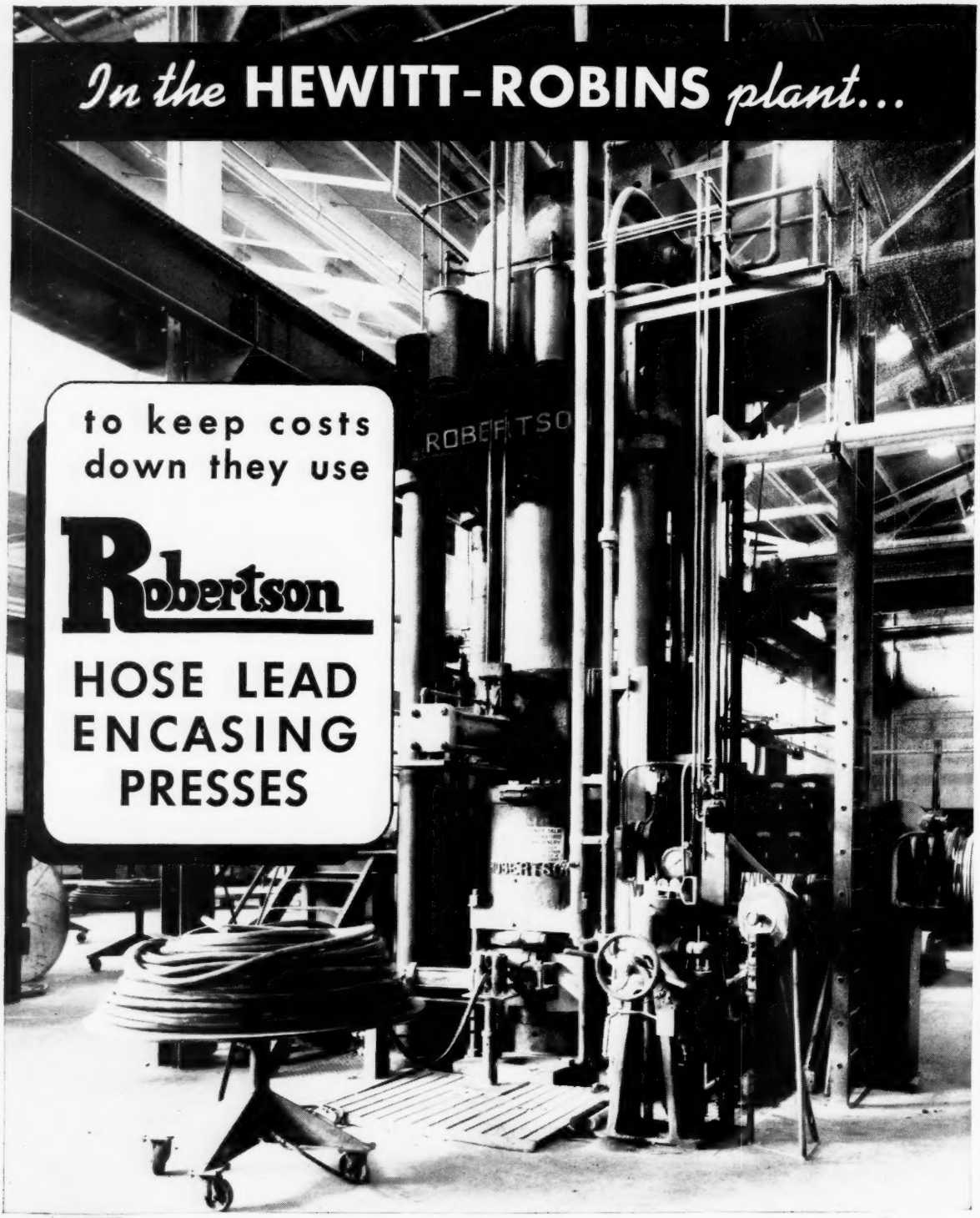

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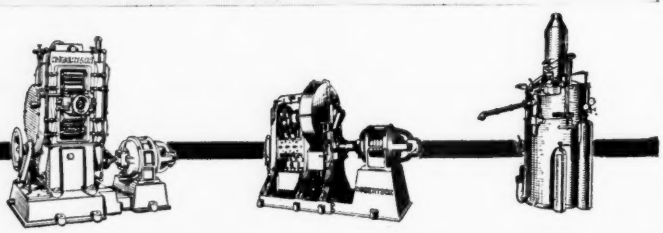

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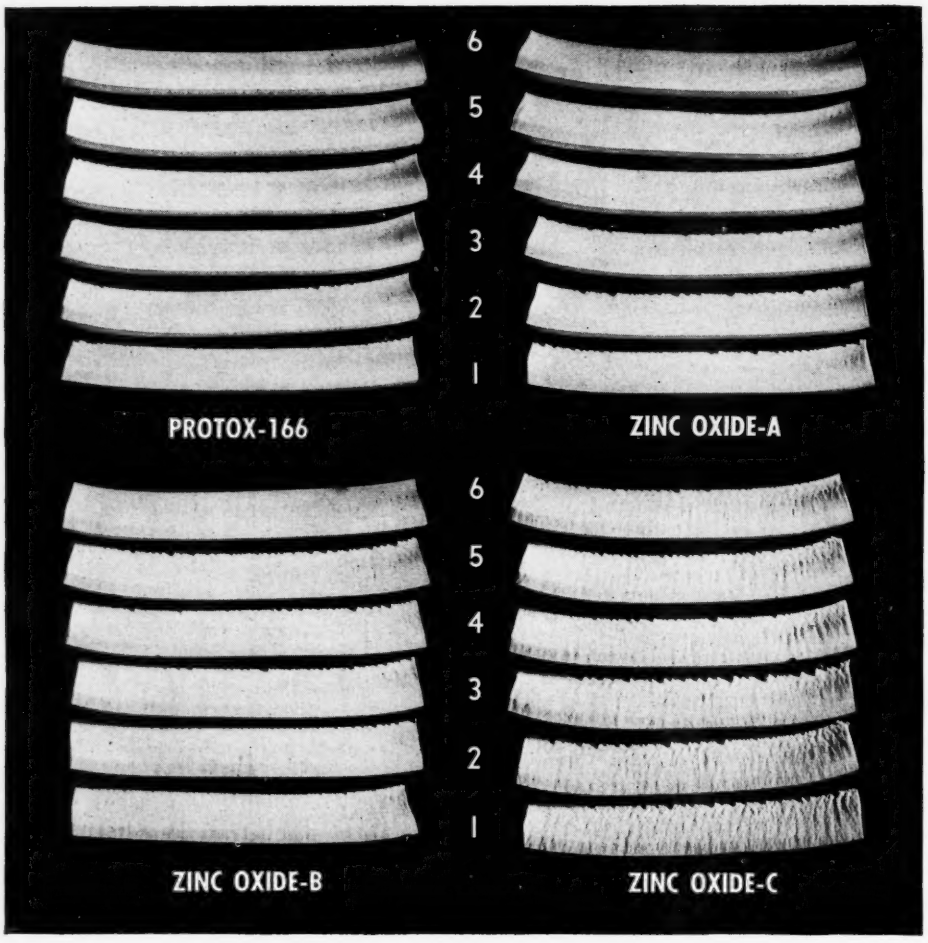

GR-S – 10
– 100 PARTS

ZINC OXIDE
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PROCESSING PROPERTIES WITH GR-S–10

GR-S-10 was premasticated for 10 minutes on a 42″ mill with a roll temperature of 20°C. The following day the several brands of Zinc Oxide were incorporated in approximately 10 minutes. The stocks were warmed-up on a laboratory mill and tubed in the Royle machine with the following conditions: Temperatures–Cylinder 40°C.; Extension 62°C.; Diehead 110°C. The temperatures of the stocks as they left the tuber were 77°C. for all of the brands.

Successive passes through the tuber produced the results shown in the above photographs.

TUBING RATE AND SWELL MEASUREMENTS

	FLOW RATE	Swelling Measurements	
	Gms. Per Minute	From 0.25″ to	Per Cent Swelling
Protox—166	127.0	0.357″	42.8%
Zinc Oxide A	114.8	0.356″	42.4%
" " B	122.4	0.374″	49.7%
" " C	134.8	0.385″	54.0%

The swelling measurements were made after chilling for 10 minutes in water.

U.S. Patents 2,303,329 and 2,303,330

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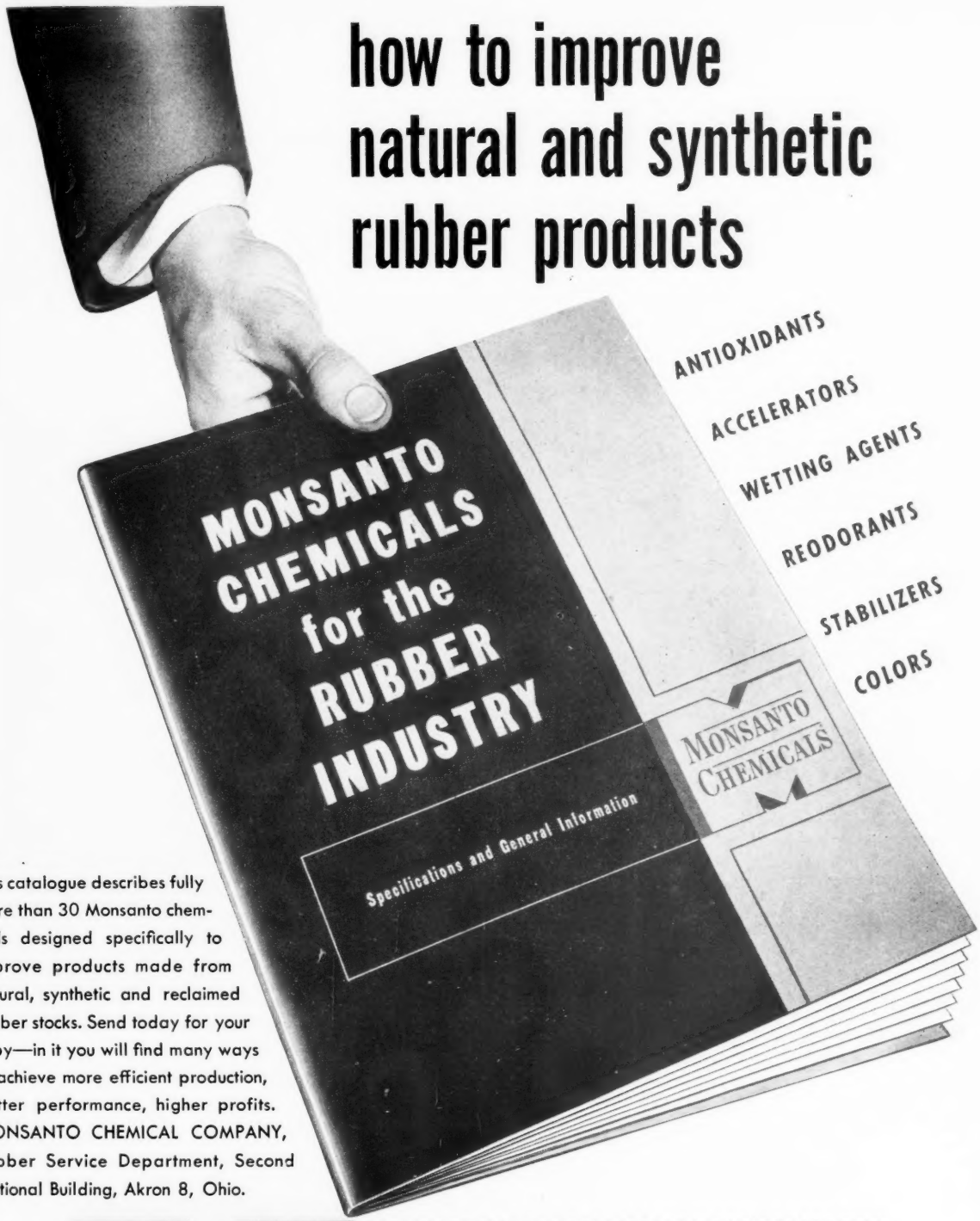

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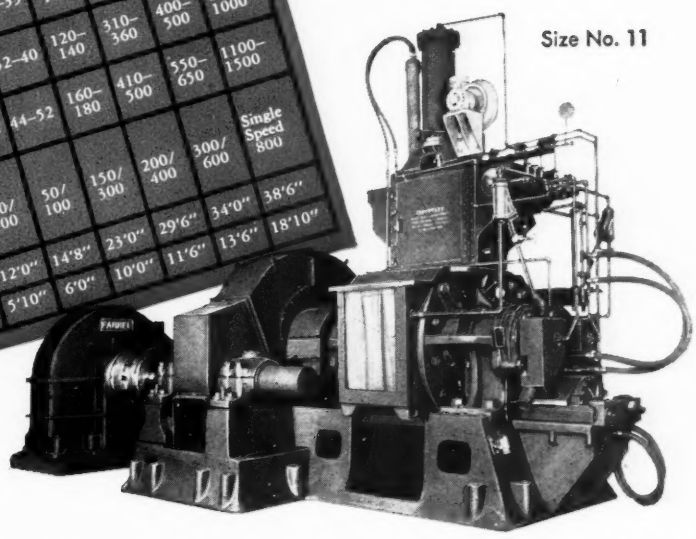
Approximate Capacity Stiff Paste Pounds per Batch	Factor x Specific Gravity	Sp.Gr. x 2.5	Sp.Gr. x 4	Sp.Gr. x 24	Sp.Gr. x 24	Sp.Gr. x 85	Sp.Gr. x 225	Sp.Gr. x 300	Sp.Gr x 600
Approximate Capacity Rubber Stocks Pounds per Batch	Crude Rubber	2	4	24	24	85	225	300	600
	1.25 Specific Gravity Stock	3	5	27–33	27–33	100–115	250–300	340–410	700–800
	1.50 Specific Gravity Stock	4	6	32–40	32–40	120–140	310–360	400–500	850–1000
	2.00 Specific Gravity Stock	5	8	44–52	44–52	160–180	410–500	550–650	1100–1500
Motor Horsepower	Standard and Double Speed	Four Speed 8½/12½/17/25	15/30	50/100	50/100	150/300	200/400	300/600	Single Speed 800
Approximate Floor Space	Length	8'0"	10'0"	12'0"	14'8"	23'0"	29'6"	34'0"	38'6"
	Width	3'0"	4'6"	5'10"	6'0"	10'0"	11'6"	13'6"	18'10"



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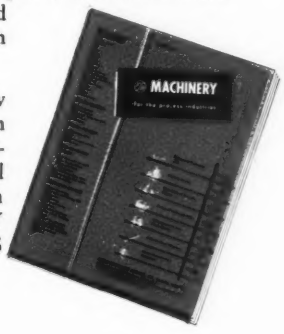

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Physical Properties				
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Moisture (max.)	1%	1%	1%	1%
Screen Residue 325 Mesh (max.)	0.17%	0.3%	0.3%	0.02%
Water Settling Test				
(Column height after 48 hrs.)	70–80%	30–40%	35–45%	40–50%
Particle Size				
Minus 2 Microns	80–85%	50–55%	63–68%	69–74%
Plus 5 Microns	4–8%	25–30%	12–15%	8–11%
G. E. Brightness	76–77%	79–80%	80–81%	83–84%
Oil Absorption (cc./100 grs. clay)	34–35	26–27	29–30	32.5–33.5
pH	4.5–5.5	4.5–5.5	5–6	4.5–5.5
Chemical Properties				
Ignition Loss	13.9–14.2%	13.9–14.2%	13.9–14.2%	13.9–14.2%
Silica	44–46%	44–46%	44–46%	44–46%
Alumina	37.5–39.5%	37.5–39.5%	37.5–39.5%	37.5–39.5%
Iron Oxide	1.5–2%	0.5–0.9%	0.4–0.8%	0.37–0.75%
Titanium Dioxide	1–2%	1–2%	1–2%	1–2%
Manganese	None	None	None	None
Physical Properties in Rubber				
Smoked Sheets	100.	100.	100.	100.
Clay	104.	104.	104.	104.
Zinc Oxide	5.	5.	5.	5.
Sulfur	3.	3.	3.	3.
Accelerator	1.	0.75	0.875	0.875
Stearic Acid	2.	2.	2.	2.
		Cure = 60'/260°F		
Modulus @ 300% (p.s.i.)	1580	1160	1360	1260
Tensile (p.s.i.)	3010	2660	2740	2710
Elongation (%)	500	520	520	525
T-50 (°C)	+15.75	+4.6	+10.5	+9.0
Tear (lbs./in. thickness)	195	155	170	180
Hardness (Shore)	57	59	61	62
Abrasion (cc./hr. loss)	68	89	84	75
Extrusion (cc./100 sec.)	90	136	122	127

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January, 1949

Volume 119 Number 4

A Bill Brothers Publication

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INDIA
RUBBER WORLD

Volume 119 | New York, January, 1945 | Number 4

Comparisons of Natural and Butadiene-Styrene Rubbers[1]

R. P. Dinsmore[2] and J. H. Fielding[2]

IN THE few years synthetic rubber has occupied the spotlight in American industry technical advances in its manufacture and use have been remarkable. The situation created by the war called for a rapid development of an all-purpose synthetic rubber to replace natural rubber. Considering availability of raw materials and the status of our knowledge at that time, both government and industry agreed that the wartime synthetic rubber should be a copolymer of butadiene and styrene. Production facilities were built up rapidly, and a rubber known as GR-S was made available to consumers. The conversion from natural to synthetic rubber was a task which involved problems in regard to quality and processing. The original GR-S was not of good quality, and it caused a reduction in efficiency in the plants consuming it. Experience in its manufacture, however, has made possible such improvement in uniformity, processing, and quality that GR-S is now an eminently satisfactory raw material. Experience in its use has made possible the development of high quality in its products.

General-Purpose GR-S

It is the object of this paper to discuss general-purpose GR-S, how it is used, and how it may be improved. It is apparent, however, that there is some disagreement as to just what may be considered general-purpose GR-S. The following typify the polymers which may fall in the class of general-purpose rubber:

GR-S	GR-S-50
GR-S-10	GR-S-AC
GR-S-20	GR-S-Black No. 1

All of these are copolymers of butadiene and styrene in the same ratio. All are used in the manufacture of approximately the same products. They differ in viscosity, conversion, type soap, type antioxidant, coagulation; and the last of the list is a masterbatch containing carbon black. While these differences may influence some properties of the polymers and may alter the mixings necessary to use them properly, the basic characteristics are substantially the same. Most of the data presented in this paper will be based on GR-S, but the generalizations are intended to apply to all members of this general-purpose class.

Comparison of GR-S with Natural Rubber

Although used to replace natural rubber, GR-S is unlike rubber in many respects. Its chief resemblance is that it is vulcanized by the same agents to produce a similar finished product. In order to discuss these differences and similarities, the subject will be broken down into the following divisions: processing, rate of vulcanization, aging, strength, resilience.

TABLE 1. SUMMARY OF PROPERTIES OF NATURAL AND SYNTHETIC RUBBER

Processing	Natural	Synthetic
Mixing efficiency—		
50 ML Mooney viscosity GR-S	100	86
40 ML Mooney viscosity GR-S	100	125
Rate of Vulcanization		
Time and temperature—same mixing	40 min., 275° F.	40 min., 300° F.
Relative rate—same mixing	3	1
Acceptable sulfur level and accelerator	2.8 sulfur	1.6 sulfur
acceleration for same rate	.9 Captax	.5 Captax/DPG
accelerator		.9/.4 Captax/DPG
Aging		
Mixing*	A	C B
Aged property as percentage of unaged	(Black)	(Black) (Black)
Modulus—7 hrs. air	94	181 138
16 hrs. air	115	200 156
7 day Geer	145	181 168
Tensile—7 hrs. air	57	87 91
16 hrs. air	31	80 82
7 day Geer	97	91 97
Strength		
"Gum" mixing		
Tensile, room temperature, p.s.i.	2100	200
Elongation, room temperature, %	800	310
Tear, 200° F., p. s. i.	180	4
Carbon black mixing		
Tensile, room temperature, p.s.i.	4100	2900
Elongation, room temperature, %	600	600
Tensile, 200° F., p.s.i.	3100	1100
Elongation, 200° F., %	680	480
Tear resistance, room temperature*	250	400
Tear resistance, 200° F.*	300	250
Flex life*—		
66⅔% perforated, room temp., min.	175	50
35% cut strip, room temp., min.	400	60
20% cut strip, 200° F., min.	500	35
PG, room temperature, min.	1200	200
200° F., min.	700	21
Ring, cycle returned to zero-kilocycles	2.4	2.6
175%-kilocycles	221	.3
Abrasion loss (angle machine) c.c. per 20 min.	6.5	5.8
Resilience		
"Gum" mixing		
Percentage rebound, room temperature	88	68
200° F.	90	77
Carbon black mixing		
Percentage rebound, room temperature	71	55
200° F.	81	64
Goodrich flexometer, △ T.° F.	28	71
Goodyear flexometer, △ T.° F.	71	147
Dynamic Hf.	72	131
Hr.	79	125

*See Table 4 for mixings and test methods.

[1] Presented before the 1948 Rubber Technology Conference, London, England, June 23, 1948.
[2] Goodyear Tire & Rubber Co., Akron, O.

Table 1 is arranged in this way. It contains a very brief summary of the more complete data shown elsewhere in the paper, supplemented from the references given. These properties will be discussed at greater length hereafter, and emphasis will be placed upon how they are changed by compounding. Since GR-S is unlike rubber and inferior to it in many respects, it is interesting to observe how a high-quality product has been made from it.

TABLE 2. EFFECT OF VISCOSITY ON PROCESSING (1942)

Type Tread	All EPC Black							
Polymer ML/212, Mooney Viscosity	16	31	32	43	47	52	60	60
Black Masterbatch								
30 R.P.M. Ban. min	3½	4¾	3½	4	4½	4½	4½	4½
Discharge temperature, °F.	232	297	265	273	297	294	304	296
MS/212 Mooney Viscosity	16	51	43	48	50	53	57	74
Remill								
30 R.P.M. Ban., min	...	2½	...	...	2½	2½	2½	2½
Discharge temperature °F.	...	280	...	...	294	297	301	265
MS/212 Mooney Viscosity	...	33	...	...	48	51	59	69
Complete Tread Stock								
30 R.P.M. Ban. min	2¼	2¼	2¼	2¼	2¼	2¼	2	2¼
Discharge temperature °F.	235	243	248	254	254	265	260	265
MS/212 Mooney Viscosity	17	26	39	47	34	39	52	66
Banbury Efficiency (%)	148	92	148	139	100	100	102	96
Extrusion								
Extrusion temperature °F.	204	216	229	239	236	240	250	248
Appearance	Smooth	Very Smooth	Rough	Rough	Smooth	Slightly Rough	Very Rough	Very Rough
Order of acceptability	2	1	4	5	3	4	6	6

Processing

The first GR-S rubbers were tough and difficult to process.[6] As the program got under way the need of a processible rubber was recognized, and a mean Mooney viscosity of 50 ML/212 was adopted. This compromise was an industry one which permitted the use of existing equipment with reasonable efficiency.

In 1942 a comparison was made of eight polymers of different Mooneys in which some were mixed with 100% efficiency (that is, in the same total time as natural rubber) and others with greater or less efficiency. The resultant effect on extrusion was studied. The details of this comparison are shown in Table 2. Briefly the GR-S was mixed with black and softener in the Banbury; after cooling it was returned to the Banbury, in some cases, for a remill; and finally it was again mixed in the Banbury with the other ingredients in order to form a complete tread stock. The figure given for Banbury efficiency was based on the total time in minutes that a Banbury would be occupied in producing 1,000 pounds of complete stock, calling the time required for rubber 100.

TABLE 3. EFFECT OF VISCOSITY ON PROCESSING (1948)

Type Tread	All EPC Blacks			EPC and HMF Blacks					
Polymer	GR-S	GR-S-20	GR-S Black 1	GR-S	GR-S	GR-S-20	GR-S-20	GR-S Black 1	GR-S
Polymer ML/212 Mooney Viscosity	50	45	38	50	50	45	45	38	50
Black Masterbatch	EPC	EPC	EPC	EPC	HMF	EPC	HMF	EPC	HMF
30 R.P.M. Ban. min	3¾	3¾	5	3¾	3¾	3¾	3¾	...	3¾
Remill									
30 R.P.M. Ban. min	2	2	...	2	...	...	...	...	...
Remill									
30 R.P.M. Ban. min	2	...	...	2	...	...	...	...	...
Complete Tread Stock									
30 R.P.M. Ban. min.	2	2	2	2		2		2	
Banbury Efficiency (%)	86	110	129	97		150		210	

All of the above give acceptable operation in extrusion.

In judging the extrusion performance of these polymers, a smooth tread and a maximum extrusion temperature of 240° F. were considered standard for rubber. A careful analysis of the data of Table 2 indicates that acceptable extrusion at 100% mixing efficiency could be obtained with 45/ML GR-S. This point means, of course, that within the specified limits of 45 to 55/ML somewhat less than 100% efficiency was obtained, particularly since any factory specification must be set up to meet the worst conditions. It is probable that even had the mean been set at 45, the early variability would not have permitted 100% mixing efficiency.

In the later development of GR-S many variables other than viscosity were found which had a bearing on processing. Among these were polymer conversion, reaction temperature, and type of modifier. By control of these as well as viscosity, GR-S has been made more uniform and consequently more efficient to mix than it was at the start. In addition to this improvement the trend to HMF black has favored processing so that now in the present formulation GR-S is usually more efficient to mix than natural rubber.

In Table 3 is a comparison of typical 1948 practice on GR-S, GR-S-20, and GR-S Black No. 1, which in a sense is a comparison of 50, 45, and 38/ML.; the table gives two formulations, an all EPC tread, and the more common mixture of EPC and HMF. In either mixing there is an advantage in lower viscosity. It might be said that 100% efficiency and acceptable tubing can now be obtained with about 47/ML in an all EPC stock or at 50/ML in a dual black stock. Because of improved uniformity, actual factory experience is closer to the efficiency indicated in the table in 1948 than it was in 1942.

The dual black-type of stock is decidedly more efficient to mix because the furnace black masterbatch does not require remilling. In this type of stock also the improvement, owing to lower viscosity, is quite marked. The improvement in connection with the use of a latex masterbatch is even greater because all the softener can be added to the other masterbatch with an overall saving of mixing time. It is, therefore, through lower viscosity rubber, the use of furnace blacks, and the use of latex masterbatches that GR-S can be more efficiently mixed than natural rubber.

Rate of Vulcanization

GR-S is much slower vulcanizing than natural rubber. In mixings which will vulcanize with natural rubber in 40 minutes at 275° F., GR-S requires about 40 minutes at 300° F. In terms of a single temperature this point means that the time required to vulcanize GR-S is about three times as long as with natural rubber. In spite of this characteristic, for reasons given later, GR-S requires less combined sulfur to bring about vulcanization than rubber does, and in fact it is necessary to maintain a lower sulfur level. While most rubber mixings use between 2% and 3½% of sulfur based on the hydrocarbon, most GR-S mixings use between 1.5 and 2.25%.

This fact, combined with the slow vulcanization of

[6] Sebrell and Dinsmore, India RUBBER WORLD, 103, 6, 37 (1941); *Ibid.*, 104, 1, 45 (1941).

TABLE 4. EFFECT OF ACCELERATION ON AGING

Aging Conditions		Unaged			7 Hrs. at 236° F. in 80 Lbs. Air			16 Hrs. at 236° F. in 80 Lbs. Air			7 Day Geer Oven		
Mixing		A	B	C	A	B	C	A	B	C	A	B	C
Vulcanization, temperature, ° F.		275	275	300	275	275	300	275	275	300	275	275	300
	Cure Time												
Stress-Strain	Min.												
300% p.s.i.	20	810	240	460	780	400	900	980	480	1180	1270	630	1060
	30	1200	490	726	1080	930	1450	.	1130	1750	1650	1250	1450
	40	1300	800	1020	1200	1150	1850	.	1360	2050	1830	1650	1850
	60	1520	980	1300	1310	1340	2130	..	1560	..	2000	1630	2160
	80	1620	1080	1580	1450	1480	2500	..	1640	..	2150	1800	2300
Tensile strength p.s.i.	20	2850	750	1100	2000	1200	2200	1150	1200	2400	3750	2000	2360
	30	3900	1850	2350	2250	2400	2500	1350	2100	2300	3850	2900	2970
	40	4030	2350	2750	2350	2550	2550	950	2150	2450	3930	2750	2750
	60	4050	2900	3000	1850	2760	2450	700	2400	2100	3700	3000	2500
	80	4050	2700	3000	1950	2750	2400	620	2530	2150	3200	2600	2300
Elongation, %	20	600	705	600	580	720	590	350	720	560	630	670	540
	30	620	740	680	530	630	510	290	530	380	580	560	510
	40	590	630	600	520	570	400	220	460	360	560	460	410
	60	565	610	530	400	540	340	180	450	270	520	480	330
	80	560	545	480	390	500	290	170	460	260	410	410	300
Best cure (hand test), min.		40	50	40									
Flex Tests:													
Cut strip, cold, min.	40	456	150	92	228	127	33	7	47	22	239	61	39
	80	327	89	40	42	59	22	2	32	11	139	39	10
200° F., min.	40	600	58	40	46	29	35	1	16	24	700	36	26
	80	354	39	29	11	23	17	1	20	15	82	30	10
P. G., cold, min.	40	700	165	215	500	165	105	55	120	45	700	125	110
	80	700	130	130	280	140	55	50	90	34	700	113	48
Tear Tests													
Cold	40	296	550	340	80	215	99	70	188	79	140	145	88
	80	198	259	203	84	140	75	80	111	73	78	123	68
Hot	40	373	335	184	116	74	30	34	121	23	203	71	30
	80	206	131	55	73	48	19	25	44	23	44	54	28
Resilience tests													
Rebound %, cold	55	71.8	52.5	54.5	72.4	55.5	56.5	71.2	56.0	57.5	73.5	57.5	56.5
	95	70.7	54.0	55.0	71.2	55.5	56.5	70.7	55.5	56.0	71.8	56.5	56.5
Deflection, inches	55	.262	.210	.206	.245	.203	.204	.239	.198	.201	.249	.197	.197
cold	95	.251	.205	.200	.245	.109	.200	.243	.197	.194	.241	.198	.198
Rebound %, hot	55	81.8	61.5	64.7	81.8	65.7	69.0	81.8	66.7	70.1	83.0	67.9	69.0
	95	81.8	63.6	67.6	80.6	65.7	69.0	81.2	65.7	69.6	81.8	66.2	69.0
Deflection, hot	55	.280	.262	.256	.265	.249	.240	.258	.245	.235	.267	.244	.235
	95	.274	.252	.240	.271	.249	.234	.263	.246	.232	.266	.241	.239

Mixings	A	B	C
Rubber	100	..	..
GR-S	..	100	100
EPC black	50	50	50
Stearic acid	3	..	..
Paraflux	3	6	6
ZnO	3	3	3
PBNA	1	..	..
Sulfur	2.8	1.6	2.8
Captax	.9	.5	.9
DPG	..	.6	..
	163.7	161.7	162.7

NOTES: Cut strip flex test is Method 10 reported by Holt and Knox[7] run at 360 cycles per minute. Overall stretch is 25% for cold test and 20% for hot test.
P. G. flex test is similar to Method 2 of same paper.
Tear test uses the piece illustrated in Figure 13 of paper by Reinsmith, but no weight is used on the pendulum. Each scale unit[8] represents 0.35-pound per inch of thickness.

GR-S, makes it necessary to use very powerful combinations of accelerators. In Table 4 is an illustration of typical tread compounding. In changing from rubber to GR-S it is necessary to raise the vulcanizing temperature about 25° F. or else go to extremely powerful acceleration. This acceleration is usually activated mercaptobenzothiazole in some form.

The course of vulcanization of GR-S usually involves the following changes in physical properties:

1. A rise in modulus.
2. A rise in tensile strength followed by a drop.
3. A decrease in ultimate elongation.
4. A decrease in set.
5. An increase in tear resistance followed by a sharp drop.
6. A drop in flex life or resistance to cut growth.
7. An increase in rebound resilience.

In each of these properties there is no doubt an optimum, but the optima do not all occur at the same time. Therefore any formulation and any chosen period of vulcanization must of necessity involve a compromise. The sharpest compromise is between flex life and resilience. If both properties are of importance, mutual sacrifices are necessary. It should be noted at this point that the way in which these properties change with vulcanization is greatly influenced by sulfur and accelerator. The best generalization is that all of the vulcanization changes mentioned in this section are exaggerated by high sulfur and by high mercaptobenzothiazole. Aging depends upon the same ingredients and must be considered in any compromise of properties.

Aging

Aging must be discussed with rate of vulcanization because the most prominent effect in the aging of GR-S is after-vulcanization or a continuation of vulcanization after removal from the mold.

The course of aging involves substantially the same changes in physical properties as vulcanization (Table 4). Oxygen does not appear to be an important factor in the sense that it is with natural rubber. For example, rubber stiffens in a Geer oven test at 158° F., but in an air bomb under air pressure the change in modulus is only slight; while the drop in tensile strength, and in fact in many properties representing quality, is very sharp. Contrasted with this, GR-S stiffens sharply in both types of aging, and the loss of tensile strength in the air bomb is only slight. Not only does oxygen fail to soften GR-S, but there is published evidence that it actually contributes to the stiffening.[4]

When these facts are being considered, aged properties must be given prominence in the determination of the proper acceleration of a GR-S compound. For stability it is important to fix the levels of both sulfur and Captax at points definitely lower than those used with rubber. In so doing the usual compromise must be made in other physical properties.

Strength

In many respects GR-S is more deficient than natural rubber in strength, by which statement is meant the

[4] Shelton and Winn, *Ind. Eng. Chem.*, 36, 8, 728 (1944).
[5] Morris and Jordan, *Rubber Age* (N. Y.), 55, 2, 161 (1944).
[6] Fielding, *Ind. Eng. Chem.*, 35, 1259 (1943).
[7] Holt and Knox, *Rubber Age* (N. Y.), 61, 6, 705 (1947).
[8] Reinsmith, India RUBBER WORLD, 116, 4, 728 (1947).

ability to resist rupture from steady or intermittent loads as measured by tensile strength, flex life, tear, and abrasion resistance. No direct relation between these properties is implied.

Since GR-S does not crystallize when stretched,[3, 5] it associated with crystallization[6] and has very little tensile lacks the self-reinforcement in the direction of strength strength in a "gum" formula (Table 1). Consequently GR-S for most purposes requires reinforcement by a pigment such as carbon black. As in natural rubber, the finest blacks produce the best tensile strength, but have an adverse effect on resilience.

Reinforced and properly vulcanized, GR-S approaches the tensile strength of rubber at room temperature, but at elevated temperatures both tensile strength and elongation drop off sharply. Rubber tensile strength, on the other hand, drops only moderately, and the elongation increases (Table 1).

Flex cracking depends both upon the initiation of cracks and their rate of growth. GR-S is superior to rubber in its ozone resistance[6] and hence has fewer surface imperfections to start cracks. On the other hand, its rate of crack growth is faster than rubber.

Crystallization affects flex life, and rubber which fails early, when flexed from zero to 300% has about 200 times the life when flexed from 200 to 500%. On the other hand, GR-S has shorter flex life if the cycle does not pass through zero elongation.

Very likely the retardation of flex cracking by deflection of the direction of cut is caused by crystallinity of the polymer for the same reason that it is caused by certain furnace blacks and clays. SRF and HMF blacks have practical value in this connection, as shown in Table 5, and, when they are used as a partial replacement of EPC, there is also an improvement in resilience. Tire tread wear is adversely affected.

TABLE 5. EFFECT OF TYPE BLACK ON FLEX LIFE TIRE TREAD

Mixing	Cure, Min., °F.	B	D
Stress-strain			
300%, p.s.i.	20 275	240	305
	30	490	590
	40	800	770
	60	980	990
	80	1080	1050
Tensile strength, p.s.i.	20 275	750	1090
	30	1850	1930
	40	2350	2090
	60	2900	2150
	80	2700	2050
Elongation, %	20 275	705	770
	30	740	710
	40	630	630
	60	610	550
	80	545	500
Best cure (hand test), min.		40	40
Flex Tests[a]			
Cut strip—cold, min.	40 275	107	155
	80	69	85
200° F., min.	40 275	66	42
	80	29	25
PG—cold, min.	40 275	235	490
	80	155	330
200° F., min.	40 275	21	36
	80	21	33
Resilience Test			
Rebound—cold, %	55 275	53.5	58.3
	95	54.5	59.3
Deflection—cold, inches	55 275	.208	.226
	95	.206	.225
Rebound—hot, %	55 275	61.0	66.8
	95	62.5	68.0
Deflection—hot, inches	55 275	.263	.275
	95	.253	.269
Goodrich — T °F.	55 275	74	66
	95	64	58
Goodyear — T °F.	55 275	143	116
	95	145	117
Mixing			
GR-S		100	100
EPC black		50	25
HMF black			25
Paraflux		6	6
ZnO		3	3
Sulfur		1.6	1.6
Captax		.5	.5
DPG		.6	.45
		161.7	161.55

[a] See "Notes" in Table 4 for test methods.

[6] Crabtree and Kemp, *Ind. Eng. Chem. Anal. Ed.*, 18, 769 (1946).

Translating these facts into terms of actual tire performance the following comparison is offered:

		Tread Compound		Sidewall Compound
		Wear	Cracking	Radial Cracking
Rubber	50 EPC	100	Slight	Bad
GR-S	50 EPC	95	Bad	...
	25 EPC	87	Slight	Slight
	25 HMF			

It has been expedient in the case of GR-S to sacrifice some wear in order to gain resistance to tread cracking as well as other advantages, thereby improving the overall durability of the tire. The performance of the synthetic sidewall should be emphasized since it has been outstandingly better than the performance of similarly loaded rubber sidewalls. This improvement is attributed to greater resistance to crack initiation.

Resilience

Resilience is of importance chiefly because it affects the operating temperature of a product, thereby influencing both the strength of the product and the aging of the compound, and also because it partly determines the engineering characteristics of any product used in vibration.

GR-S has considerably lower resilience than rubber. It can be raised by increasing state of vulcanization and will increase on aging. With this change there is usually associated a sharp drop in flex life and tear.

Resilience increases with temperature, and this change is greater at higher states of vulcanization. At a low state of vulcanization, possibly 20 to 30% of the optimum, the change in resilience in going from room temperature to 200° F. is zero. This point of zero change is not the same for all polymers. One of the most notable exceptions is Buna S-3. Its resilience changes very little at the optimum vulcanization and actually decreases with an increase in temperature at points below the optimum.

In Table 4 may be found the influence of accelerator and state of vulcanization on resilience. It is unfortunate that it is the undesirable type of acceleration which produces the higher resilience (particularly hot). This effect appears to be inescapable. However, in Table 5 it is seen that the high resilience contributed by HMF Blacks makes them an important factor in tread compounding.

The lower resilience of GR-S makes it necessary to expend more work in rolling a tire, resulting in a higher tire temperature. In the following comparison, rolling resistance is shown for three variations of a 6.00-16 tire. All elements of the tire not mentioned were held constant.

Rubber as Percentage of Total Hydrocarbon	Tread Cap	Tread Base	Sidewall	Lbs. Drag 1,000 Load
100	Rubber	Rubber	Rubber	13.5
94	Rubber	Rubber	GR-S	14.2
57	Rubber	GR-S	GR-S	14.9

It is clear that there is an increase in rolling resistance due to GR-S, whether used in the tread base or the sidewall, but the combined effect is only about 10%.

Adjustment of Properties by Changes in Polymer

There is every reason to believe that the rubber chosen as GR-S during the war period is not the best that can be made. It is to be expected that a better rubber will be developed, and that it will involve no compromise in its characteristics. A tremendous amount of work has been done on the subject, and it is true that many rubbers have been developed which have been better than GR-S in some respects, having disadvantages in others. This development has opened up several promising leads. Of these leads, viscosity, reaction temperature, and conversion appear at present to be most promising.

High viscosity was one of the distinguishing features of the German Buna. Associated with it were higher tensile strength, higher resilience, and in many cases better wear. However, when Buna S-3 was heat softened to a point where it could be mixed and processed with the same high efficiency as GR-S, the advantage in wear, at least, was lost.

There is evidence that high viscosity obtained by a reduction in modifier, leaving temperature and conversion the same, results in improved physical properties. A comparison of three levels of viscosity is shown in Table 6. It is quite clear that as viscosity is increased, modulus and rate of vulcanization are increased. Some, but not all of the effects on other physical properties are caused by this trait. Tensile strength and resilience are increased markedly beyond what would be expected from the higher state of vulcanization. Tear resistance and flex life are lowered somewhat, but could probably be compensated by lowering the state of vulcanization. The net effect is a better-quality polymer, but one which cannot be processed in present equipment.

TABLE 6. EFFECT OF POLYMER VISCOSITY

Raw ML Mooney Viscosity	34	54	85
300% modulus, p.s.i.	710	790	1350
Tensile strength, p.s.i.	2620	3090	3130
Hot tensile strength, p.s.i	840	790	990
Percentage rebound, room temperature	53.3	55.5	59.5
200° F.	61.8	63.9	70.2
Tear, room temperature*	280	230	80
200° F.*	90	55	12
Flex rating, 200° F.	90	100	54
Processibility	Excellent	Normal	Poor

*See "Notes" in Table 4 for test methods.

A more comprehensive piece of work is shown in Table 7 where 14 different polymers made on a fairly large scale covered simultaneously both viscosity and conversion. The viscosity varied between 30 and 70 ML in steps of 10, and the conversion between 62 and 82% in increments of 5. Sufficient combinations were investigated to give a good cross-section and to show the extremes. Both compounded viscosity and a laboratory processing rating may be taken as a measure[10] of processibility. It is quite clear that at any level of raw viscosity, processibility improves as conversion is lowered, and it is true, of course, that low ML improves processibility. The net effect, however, is that by lowering conversion, equal processibility may be obtained at a higher raw viscosity. In the present work it is apparent that about 60 ML and 62% conversion are equivalent in processibility to 50 ML and 72% conversion. The trend of tensile strength with these variables is gradual, but very definite, indicating that higher tensile strengths are obtainable with lower conversion and higher viscosity. The trend of the other properties is not so clear because it is upset by an increase in state of vulcanization as raw viscosity is increased. There is a tendency, however, for flex life to improve with no loss in rebound as conversion is lowered. This, then, is one of the hopeful leads. Lower conversion brings about slightly improved quality and at the same time permits the use of a higher raw viscosity, thereby gaining the additional quality advantage of higher raw viscosity.

Reduction in reaction temperature has an effect similar to that of conversion in that it permits somewhat higher viscosity and at the same time entails a slight quality advantage of its own. The combined effect of low conversion, low temperature, and higher viscosity is shown in Table 8. The two low-temperature recipes have been adjusted to get a reasonable reaction rate at the low temperature. Rates of vulcanization are not equal, but despite this inequality it is easy to see that the low-temperature polymers have higher tensile strength, higher rebound, and better flex life than GR-S. Recent experiments with still lower reaction temperatures look very promising.

TABLE 7. EFFECT OF VISCOSITY AND CONVERSION

Compounded MS Mooney Viscosity

Raw ML	Conversion % 62	67	72	77	82
30	20		28		29
40			36		
50	44	40	45	52	53
60	52		58		
70	53		73		71

300% Modulus, P.S.I.

Raw ML	Conversion % 62	67	72	77	82
30	730		710		675
40			1135		
50	800	930	940	1025	855
60	875		1230		
70	1065		1350		1370

Rebound 200° F. %

Raw ML	Conversion % 62	67	72	77	82
30	60.8		61.8		61.3
40			64.1		
50	63.4	66.7	65.0	66.5	63.1
60	65.7		66.8		
70	69.5		70.2		69.2

Process Rating

Raw ML	Conversion % 62	67	72	77	82
30	1.4		1.8		3.8
40			2.5		
50	3.0	3.9	4.0	4.9	4.8
60	3.9		5.6		
70	6.7		7.5		7.8

Tensile Strength, P.S.I.

Raw ML	Conversion % 63	67	72	77	82
30	2840		2680		2550
40			2870		
50	3100	3290	3000	3180	2470
60	3100		3080		
70	3230		3280		3060

Flex Rating

Raw ML	Conversion % 62	67	72	77	82
30	119		118		113
40			104		
50	106	95	100	85	87
60	86		89		
70	71		72		50

TABLE 8. EFFECT OF LOW POLYMERIZATION TEMPERATURE

	Modified Polymer Made at 122° F. to 72% Conversion and 50 ML Mooney Viscosity	Unmodified Polymer Made at 58° F. to 60% Conversion and 40 ML Mooney Viscosity	Modified Polymer Made at 36° F. to 60% Conversion and 56 ML Mooney Viscosity
300% modulus, p.s.i.	850	900	550
Relative tensile strength	100	125	125
Rebound percentage, room temperature	54.0	58.8	52.8
200° F.	63.6	67.6	64.4
Flex rating, 200° F.	100	120	200
Processibility	Normal	Normal	

There is every reason then, to expect an improvement in GR-S, even though the butadiene-styrene system is retained. Unlike many previously hoped-for improvements, this one should not carry with it the disadvantage of poor processing.

Summary and Conclusions

GR-S is unlike rubber in most respects and inferior in many.

At present it is efficient in processing, and high-quality

(*Continued on page* 506)

[10] Taylor, Fielding, Mooney, *Rubber Age* (N. Y.), 61, 6, 705 (1947).

Progress in Rehabilitation of Malayan Rubber Plantations

RUBBER plantations in Malaya, which cover nearly 2,000,000 acres with around 300,000,000 rubber trees, are composed of large estates and smallholdings, with about 250,000 of the latter. After years of Japanese occupation, much of Malaya was devastated. Its rubber plantations were without machines, materials, or manpower. Equipment had to be imported, labor recruited and trained.

In spite of these handicaps Malaya produced more rubber in 1948 than ever before in history, more than 700,000 long tons with a value of $300,000,000. Sales of this Malayan rubber to the United States in 1948 will produce more dollars than the sale of all manufactured British exports to this country combined.

In view of the importance of this dollar income, the British rubber-producing industry has embarked upon an extensive program of research and publicity to develop and expand new uses for rubber in the United States. Early in 1947 it set up the Rubber Development Bureau in Washington, D. C., to aid this objective.

The Rubber Development Bureau recently received through the British Information Services a large number of photographs which show the progress being made in the rehabilitation of the Malayan rubber industry. A few of these pictures from the Socfin Sengli Tinggi Estate and the Dunlop Ladang Geddes Estate are reproduced here.

Figure 1 pictures part of a factory at the Socfin Sengli Tinggi Estate that is used for the production of crepe rubber, and Figure 2 shows the operation of leveling a site for a more up-to-date factory as a part of the task of enlarging and reequipping this factory.

Figure 3 reveals the initial operation in the production of crepe rubber on the Socfin Estate. Scrap rubber that has not been collected soon after tapping, is coagulated in the field and used for the manufacture of crepe rubber. In Figure 4 a new crepeing machine is being moved into the factory for installation.

The factory in the center of the Dunlop Estate is shown in Figure 5. At the right is the concentrated latex section, in the center are three sheds housing crepeing and rolling mills, and at the end are three drying sheds. Latex at the factory is separated into concentrate and skim in the battery of centrifuges shown in Figure 6. This concentrate from each machine is discharged into a tank where the correct amount of ammonia is added to prevent coagulation, after which step the latex is transferred to the 16,000-gallon storage tanks, shown in the foreground of Figure 7, to await shipment.

In connection with the packaging of baled rubber, Figure 8 illustrates the present method in which a coating of French chalk is first given the bale, which then is wrapped in more sheets of rubber. It has been discovered that if the two sheets of rubber are punctured together with the two-pronged jabber along their edges, they will hold firmly and safely together. No canvas or stitching is needed. Finally, the whole bale is washed with French chalk to prevent the bales from sticking to one another in transit.

Malayan Rubber Statistics

The following statistics for October, 1948 have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe			Latex, Concentrated Latex, and Revertex (Dry Rubber Content)		
		Malayan Union			Malayan Union	
	Singapore Export Proper	Trans-shipped	Direct Shipments	Singapore Export Proper	Trans-shipped	Direct Shipments
Argentine Republic		25			3	
Australia	1,924	512	50	21	82	
Belgium	221	56	414		47	8
Bulgaria	200					
Canada	443	20	1,124			
Chile	13					
China	357					
Cyprus	6					
Czechoslovakia	26					
Denmark	148		308	11		
Egypt	5				6	
Finland	350		200		3	
France	1,243	72	1,537	25	3	
Germany	1,081	280	717		204	82
Hong Kong	1,097		356			
Italy	642	245	915	1		
Japan	220	62	1,306			
Mexico	256		170			
Netherlands	213	54	425	50	39	
New Zealand	95	61			13	
Norway	175	156	255		4	
Other countries in Africa	180					
South America	287		65			
Pakistan	12					
Portugal			30			
Rumania	150					
Russia	8,712		8,620			
Sweden	1,395	595	169	99	13	
Switzerland	90	3	20			
Turkey	56		115			
Union of India	150	50	680	½		
Union of South Africa	1,362	80	175	16	2	
United Kingdom	3,330	867	5,043	715		18
U. S. A.	14,426	897	12,075	287		839
TOTAL	38,785	4,035	34,769	1,225½	419	947

Foreign Imports of Rubber in Long Tons

Singapore Imports from	Dry Rubber	Wet Rubber (Dry Weight)
Banka and Billiton	393	25
Brunei	102	5
Burma		1
Dutch Borneo	1,088	217
Java	*2,238	
North Borneo	1,046	32
Other countries in Asia	27	5
Other Dutch Islands	79	4
Rhio Residency	528	35
Sarawak	2,064	28
Sumatra	†5,986	7,370
TOTAL	13,551	7,722

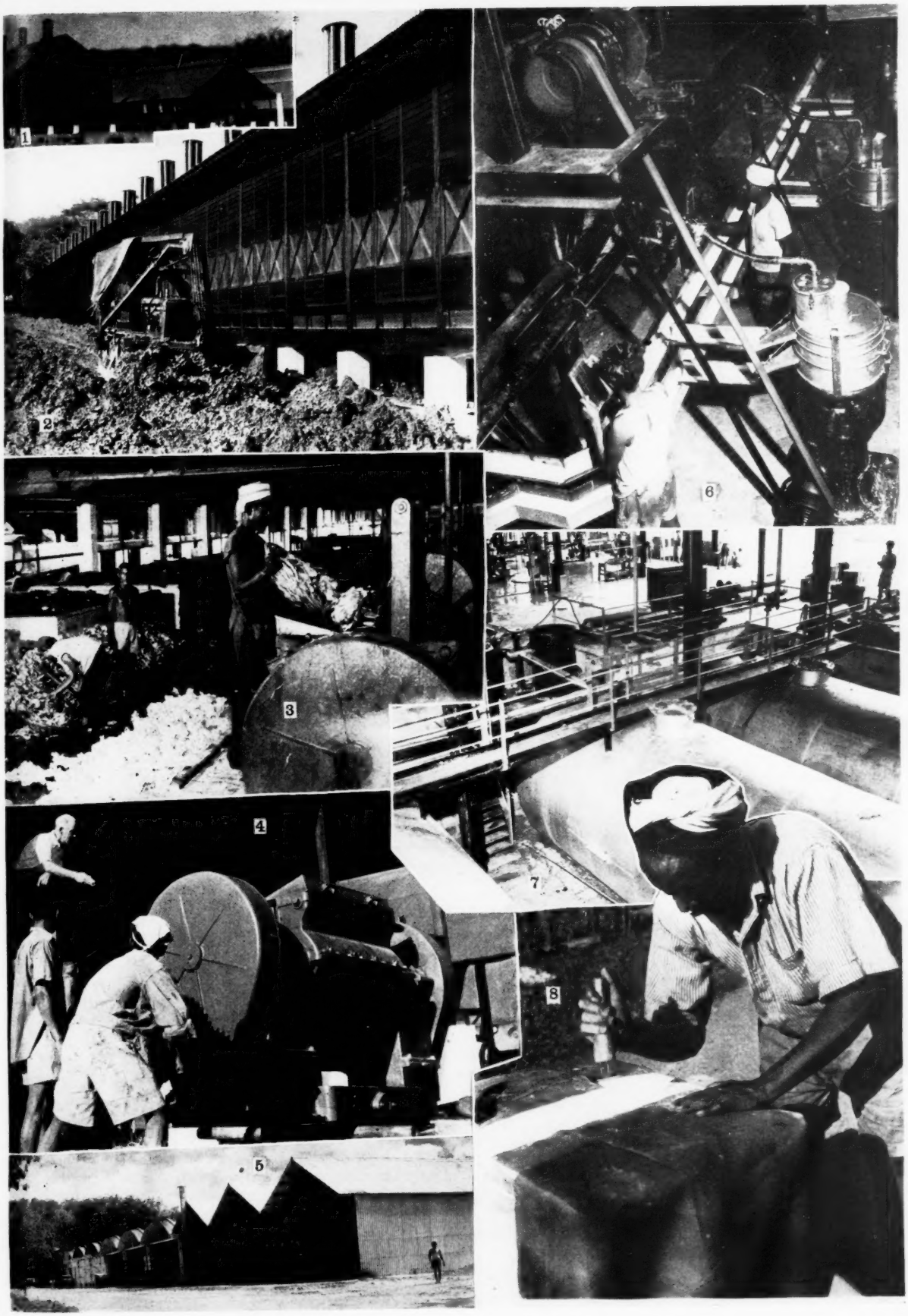
*Includes one ton sole crepe.
†Includes 5 tons sole crepe.

Federation of Malaya Imports from		
Burma	36	4
Siam	1,079	4
Sumatra	1,537	1,478
TOTAL	2,652	1,486

Dealers' Stocks	Tons
Penang and Province Wellesley	10,961
Singapore	46,490
TOTAL	57,451

Port Stocks in Private Lighters and Railway Godowns	
Penang and Province Wellesley	6,136
Port Dickson	5
Port Swettenham	1,248
Singapore	12,944
Teluk Anson	293
TOTAL	20,626

Production	
Estates	34,020
Small holdings (estimated)	16,347
TOTAL	50,367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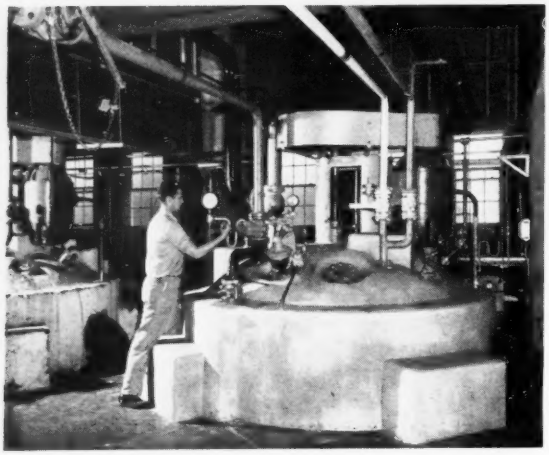
Advances in Rubber, 1947—1948—I[1]

Lois W. Brock[2], G. H. Swart[2], E. V. Osberg[2]



Low-Temperature GR-S Polymerization Reactor with Eight-Inch Layer of Cork and Asbestos Insulation

THE past year has seen a number of advances in the field of rubber, at least one of which may prove to be of real significance in the years ahead. To measure better such achievement, it would be well to look briefly into the past. After Charles Goodyear discovered vulcanization in 1839, progress in rubber technology was quite leisurely until the beginning of this century. In 1906, George Oenslager discovered the accelerating affect of aniline, the first organic accelerator. This spectacular advance was followed by the discovery of rubber reinforcement by carbon black, providing much improved wearing qualities for tires. Although the Germans produced and used dimethylbutadiene polymers during the first World War, it was not until neoprene and "Thiokol" were introduced in the early Thirties that the rubber manufacturer had more than one basic elastomeric substance for his commercial operations. During that same period the commercial large-scale development of natural rubber latex became a reality.

The chemical engineering achievement of designing and building facilities to produce nearly a million tons of GR-S a year is well known. Although progress in the quality and use of GR-S was rapid, it appeared that the natural product would still hold preference as a general-purpose rubber following the end of the war. The past year, however, has seen the initiation of the first real commercial threat to the dominance of natural rubber. Low-temperature rubber, especially in conjunction with the new furnace carbon blacks, may mark a new milestone in the progress of rubber technology. Although much of the basic work was done before 1947, and pilot-plant operations had been started in 1946, the first plant scale runs of low-temperature rubber were made at the Institute, W. Va., copolymer plant by the United States Rubber Co. in the Summer of 1947. The next important move was the granting of permission by the Office of Rubber Reserve to Copolymer Corp. in October, 1947 to convert one-half of its annually rated capacity of 30,000 long tons of GR-S to the production of 41° F. rubber. Recent authorizations will convert about half of the existing active and profitable GR-S plants to this type of operation with a productive capacity of 183,000 long tons a year.

New Developments and Processes

Elastomer Developments

A detailed account (1)[3] of GR-S polymerized at low temperatures covers the development, pilot-plant and large-scale production of this new polymer, describes the physical properties of the rubber, and points out possible future work. This report, built around a specific plant installation, cites 47 references in the literature. A pilot-plant for making low-temperature rubber (2) was designed in 1942 following methods suggested or developed in this country and in Germany. Low-temperature polymerization, as developed by the Phillips Petroleum Co. (3), has given rubber with good abrasion resistance without sacrificing resistance to cracking and cut-growth. Although standard channel or furnace black reinforcement gives excellent hysteresis-flex-life, high abrasion furnace blacks give, in addition, unexpected improvement in tread wear. The effect of polymerization temperatures below 30° C. has been studied (4), and it was found that GR-S produced at temperatures as low as 10° C. processed better and yielded vulcanizates with superior stress-strain properties and more resistance to flex-crack growth, tear, and abrasion than does standard GR-S produced at 50° C. The early formulae resulted in long reaction times, but more recently faster recipes have permitted polymerization to occur with normal rates even at subfreezing temperatures.

The development and availability of more than 400 experimental and general-purpose GR-S polymers has been discussed (5), and it has been pointed out how these polymers came into being and what advantages they offer. Of the 411 experimental GR-S polymers scheduled up to October, 1947, 28 have been transferred into the numbered GR-S classification, such as GR-S-10 and GR-S-50. This point and the fact that Standard GR-S represents less than 50% of government synthetic rubber production focus attention on the fact that GR-S is a family of styrene copolymers, practically always with butadiene although with isoprene in some cases. Monthly listings in the rubber trade journals of experimental GR-S polymers brings the total up to 460 at the end of the period under review. These newer types include low-temperature rubber, variations in previous GR-S polymers, and new developments in latex-compounded black masterbatches.

"Thiokol" LP-2, a polyfunctional mercaptan, is a polymer manufactured in a liquid state and can be converted by catalysts to a tough rubber without appreciable shrinkage (6). LP-2 remains flexible at —65° F. and has been recommended for service temperatures up to 250° F.; it can be applied as a liquid in places difficultly accessible for a solid rubber-like material and then cured *in situ* to a solid. "Thiokol" PR-1 (7) is classified as a tailor-made polysulfide-type rubber with good dimen-

[1] Presented before the Rubber & Plastics Division, A.S.M.E., New York, N. Y., Nov. 30, 1948. In accordance with the policy of A.S.M.E. which aims to have future papers of this nature cover the literature from June of one year through the following June, the present paper begins where "Advances in Rubber in 1947" ended, *viz.*, October, 1947, and continues through June, 1948.

[2] General Tire & Rubber Co., Akron, O.

[3] Numbers in parentheses refer to similarly numbered references in bibliography at end of paper. Unnumbered, supplementary references are found with related articles in the bibliography.

sional stability in aromatic and non-aromatic fuels, as well as many other commonly known and used solvents. This material, it is further claimed, has good low-temperature flexibility and resistance to compression set and aging.

Improved formulations consisting of highly plasticized, high molecular weight Butyl rubber have been studied, and correlations established between the performance and physical characteristics such as rebound, rate of retraction, modulus, and viscosity of the softener used (8). Another approach involves increasing the unsaturation so that the polymer may be brought to a higher state of vulcanization. Compounding studies including both acceleration and filler-addition are being made in order to improve Butyl rubber for low-temperature service.

Copolymers of butadiene with 2-vinyl furane, 2-vinyl thiophene, methacrylonitrile and vinylidene chloride have been prepared and described (9). The quality of copolymers from 2-vinyl thiophene and methacrylonitrile compares favorably with that of GR-S. Copolymers of dienes with substituted vinyl pyridines have shown promise as synthetic elastomers yielding vulcanizates with high modulus, high tensile strength, and superior flexing-hysteresis balance (10). In the quest for rubber hydrocarbon sources during the war, attention was given to rubber-bearing plants other than *Hevea brasiliensis* (11-15). One of these studies implied that none of these lesser known plants can become a serious competitor to *Hevea brasiliensis*.

Under certain conditions linear rubber polymers are produced by the condensation of a dibasic acid and glycol or diamine (16). One of these, a diisocyanate-modified polyester amide (Vulcaprene A), is compatible with nitrocellulose, polyvinyl formal, cellulose acetate, degraded vegetable tanned leather, and other high polymeric materials. Such combinations find utility as coatings and leather substitutes. There has been a review covering chlorinated rubber, rubber hydrochloride, cyclorubber, oxidized rubber, hydrogenated rubber, and thermoplastic molding resins formed by reacting rubber with substances like phenol, maleic anhydride, aldehydes, peracids, etc. (17). The preparation and properties of a typical commercial cyclorubber have been given together with its application in coatings, hot melts, lacquers, electrical insulation, inks, and adhesives (18).

Basic reactions occurring during rubber reclaiming have been studied with reference to the influence of reclaiming media, antioxidant, and defibering agents at 195 p.s.i. steam pressure (19). A review has been presented of the transition in reclaimed rubber from a straight natural-rubber base to a combination of natural rubber and GR-S, and comparisons have been made between prewar and present types (20). Physical data for tire, mat, black heel, and hard rubber battery container stocks indicate that replacement of prewar reclaims with present grades can be made without sacrificing quality and with the advantage of improved processing.

Polymerization

A comparison of the properties of polybutadiene, methylated polybutadiene, and copolymers of butadiene with various vinyl monomers has been made (21). The effect of methyl groups and other substituent groups on the properties of straight-chain polybutadienes is discussed. The greater the number of substituents, the poorer are the freeze properties of the polymers. The effect of substitution on the reactivity of the styrene double-bond toward free radical attack has been studied with reference to copolymerization (22, 23).

The effect of different peroxides as catalysts and different polyhydroxy compounds as reducing activators both in the presence and absence of metals in a redox-activated emulsion copolymerization of butadiene and styrene has been determined (24). The need of careful balance or tuning of any reduction-activation system is emphasized. A redox-activated emulsion polymerization system has been investigated in which benzoyl peroxide, sorbose, and ferrous ammonium sulfate constitute the oxidation-reduction system yielding rapid rates of reaction for low-temperature polymerization (25). A redox system consisting of cumene hydroperoxide, a reducing sugar, and iron pyrophosphate has been found effective for initiating emulsion polymerization with disproportionated rosin soap emulsifier (26). The copolymerization of butadiene and styrene (GR-S) with this system gave 72% conversion in two hours at 43° C. or in 23 hours at 15° C. In a study covering polymerization theory, the reduction-activation is described in relation to German redox-formulation (27). A number of additional activator systems for the copolymerization of butadiene and styrene have been studied (28-33) and also the inhibiting and retarding effect of certain classes of materials (34-37). Considerable attention has been given to the use of mercaptans and mercaptan derivatives as modifiers for emulsion polymerization of butadiene and styrene (38-42). A comprehensive review has been made covering the part that organic chemistry played in the development of synthetic rubber during the war period (43).

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New Developments and Processes

Elastomer Developments

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[1] Abstract only.

(Continued on page 472)

Effect of Some Accelerators on the Physical Properties of Nitrile Rubber Vulcanizates[1]

Ross E. Morris,[2] Robert R. James,[2] and Irvin P. Seegman[2]

THE selection of an accelerator for a rubber stock depends on several factors, such as the circumstances of processing and curing and the service conditions of the vulcanizate. The authors were faced with the problem of selecting the accelerators for nitrile rubber stocks to be used in the manufacture of gaskets and resilient mountings, respectively. Both of these applications require stocks with a high state of cure, since in the case of gaskets stress relaxation must be held to a minimum, and in the case of mountings drift must be held to a minimum. Accordingly, the selection of accelerators was narrowed to those known to create a high state of cure.

Considerable information has been published in sales literature (1)[3] and trade magazines (2) on the effects of different accelerators and curing agents in nitrile rubbers. None of these sources, however, gives information on the use of tetramethyl thiuram monosulfide,[4] a delayed-action accelerator known to produce a high state of cure in natural rubber stocks and GR-S rubber stocks. Because of its delayed action this accelerator is particularly desirable for use in stocks to be molded into complicated shapes. These advantages made tetramethyl thiuram monosulfide appear attractive for nitrile rubber gasket and mounting stocks, and work was therefore undertaken to evaluate this accelerator for these stocks.

It seemed best to evaluate tetramethyl thiuram monosulfide in comparison with accepted accelerations for nitrile rubbers. Those selected for comparison were dibenzothiazyl disulfide[5] and a no-sulfur acceleration consisting of tetramethyl thiuram disulfide,[6] mercaptobenzothiazole,[7] and a small amount of selenium.[8] The former acceleration is probably the most commonly used acceleration in nitrile rubber. The latter acceleration is noted for producing outstanding strength properties, particularly ultimate elongation, as well as good resistance to heat aging.

Table 1. Composition of Stocks

	A	*B*	*C*	*D*	*E*
Hycar OR-15	100.0	100.0	100.0	100.0	100.0
Pelletex (SRF black)	60.0	60.0	60.0	60.0	60.0
Zinc oxide	5.0	5.0	5.0	5.0	5.0
Thermoflex A	1.0	1.0	1.0	1.0	1.0
Stearic acid	1.0	1.0	1.0	1.0	1.0
KP-140	15.0	15.0	15.0		15.0
Plasticizer SC	15.0	15.0	15.0		15.0
Cumar P-10				30.0	
Altax	1.25				
Thionex		0.3	2.0	2.0	
Captax					2.0
Methyl Tuads					3.0
Vandex					0.1
Sulfur	1.25	1.2	0.9	0.9	

Stocks Tested

The compositions of the five stocks tested in this study are given in Table 1. The only variables in these compositions were the accelerators and curing agents except in Stock *D*, wherein coumarone-indene liquid polymer was substituted for the ester softeners. The five stocks consisted of two normal-sulfur stocks (*A* and *B*) with dibenzothiazyl disulfide and tetramethyl thiuram monosulfide acceleration, respectively; two stocks with lower sulfur content and higher tetramethyl thiuram monosulfide content (*C* and *D*); and one stock with the no-sulfur acceleration described above (*E*). The selection of the respective accelerator-curing agent ratios in the tetramethyl thiuram mono-sulfide stocks (*B*, *C*, and *D*) was based on an extensive preliminary study of the effects of different ratios on physical properties. The data from one such study are given in Table 2 to illustrate the care taken in this selection.

None of the five stocks scorched in 60 minutes at 212° F. when tested in the Mooney viscosimeter using the small rotor (4).

All test specimens were cured 50 minutes at 310° F. except the ASTM compression set specimens, which were cured 55 minutes at 310° F. because of their size. The 50-minute cure for the five stocks was established on the bases of the resilience and compression set data plotted in Figures 1 and 2, respectively, and was an overcure from the standpoint of tensile properties. The plotted data show that after 50 minutes' cure the resilience of each stock had attained practically a maximum value, and the compression set of each stock, except *A* and *B*, had reached practically a minimum value. Although the compression sets of the latter stocks were not near their attainable minimum values, it was felt that the 50-minute cure was all that could be allowed for practical purposes.

The five stocks were evaluated by testing for certain physical properties which were grouped under the following classifications: strength, mechanical, and rheological. Each of these classifications will be taken up in turn, giving the methods of testing and the results of the tests.

[1] Presented before the Division of Rubber Chemistry, A. C. S., Los Angeles, Calif., July 23, 1948. The opinions or assertations in this article are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.
[2] Rubber Laboratory, Mare Island Naval Shipyard, Vallejo, Calif.
[3] Numbers in parentheses refer to Bibliography items at end of article.
[4] Monex, Thionex.
[5] Altax, MBTS, Thiofide.
[6] Tuads, Thurad, Thiuram M, Tuex.
[7] Captax, MBT, Thiotax.
[8] Vandex.

Table 2. Survey of Sulfur Ratios in Stock D

	0.5-Part Sulfur			0.7-Part Sulfur			0.9-Part Sulfur			1.1-Parts Sulfur		
Minutes cure at 310° F	20	40	60	20	40	60	20	40	60	20	40	60
Tensile strength, p.s.i.	1860	1970	2040	2060	2080	2040	2050	2090	2090	2020	2010	2140
Ultimate elongation, %	600	590	580	540	520	500	480	470	450	430	420	440
Shore hardness (10 sec.)	45	48	47	48	50	50	50	51	52	52	53	54
Yerzley resilience, %*			53.2			52.9			52.9			52.9
Dynamic modulus, p.s.i.*			1250			1250			1280			1280
Compression set†	36.1	27.3	25.7	26.1	21.8	20.7	24.3	18.7	17.2	22.3	18.4	18.1

*Measured on Yerzley oscillograph at compressive stress of 100 p.s.i. (3).
†ASTM D 395-47T, Method B (1), 40% deflection, conditioned 7 days at 130° F., using Yerzley specimen.

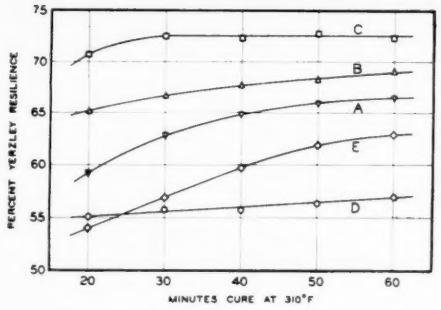


Fig. 1. Effect of Curing Time on Resilience

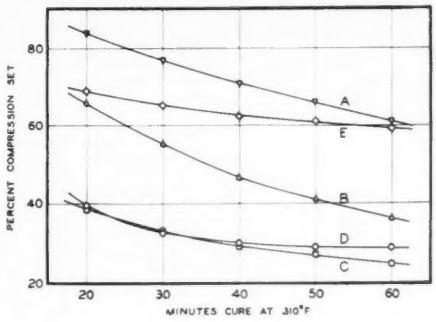


Fig. 2. Effect of Curing Time on Compression Set

Strength Properties

Methods of Evaluation

The strength properties which were determined were tensile strength, modulus, ultimate elongation, and tear resistance, all at 82° F. The first three properties were determined in accordance with the ASTM specification (5) except that the Rubber Reserve test specimen (6) was used. The constricted portion of the dumbbell-shaped Rubber Reserve test specimen is 1¼ inches long. The Graves angle specimen (7) was used for determining tear resistance.

Results of Tests

The strength properties are listed in Table 3. Each value in the table is the average of six test results. The thiuram stocks with ester softeners were weaker than the stocks of the other accelerators in all respects except modulus. High thiuram Stock *C* was the weakest in tensile strength, ultimate elongation and tear resistance, but highest in modulus, indicating the highest state of cure. As a result of changing softeners from esters to coumarone-indent liquid polymer, Stock *D* excelled Stock *C* in tensile strength, ultimate elongation, and especially tear resistance.

TABLE 3. STRENGTH PROPERTIES

Stock	Tensile Strength P.S.I.	Modulus at 300% Elongation P.S.I.	Ultimate Elongation %	Tear Resistance Lbs. per In. Thickness
A	2230	1100	530	171
B	1980	1310	440	139
C	1710	1390	370	132
D	2040	1360	450	171
E	2450	720	740	178

Mechanical Properties

Methods of Evaluation

By mechanical properties are meant instantaneous and 10-second Shore hardness, static and dynamic moduli, resonant frequency, resilience, and absorbed energy, determined at 20 and at 82°F. The Shore hardnesses were measured with the Type A instrument. Static and dynamic moduli, resonant frequency, resilience, and absorbed energy were determined with the Yerzley oscillograph, following the instructions given by Yerzley (3). The oscillograph used was the latest design with a beam section of 1.0 by 1.5 inches. All reported data are the average of at least two determinations.

Results of Tests

The values obtained for the mechanical properties are listed in Table 4. The stocks are shown to range in instantaneous Shore hardness at 82° F. from 40 to 54 and in 10-second Shore hardness from 39 to 49. High thiuram Stock *C* was the hardest of the ester stocks, followed in order by low thiuram Stock *B*, thiazyl Stock *A*, and no-sulfur Stock *E*. Coumarone-indene Stock *D* was harder than the corresponding ester Stock *C*. The difference between the instantaneous and 10-second readings was one point for the stocks softened with esters, but was five points for Stock *D*.

TABLE 4. MECHANICAL PROPERTIES

Stock	*A*	*B*	*C*	*D*	*E*
Instantaneous Shore Hardness					
At 82° F.	43	45	47	54	40
20° F.	53	54	55	96	51
Difference	−10	−9	−8	−42	−11
10-Second Shore Hardness					
At 82° F.	42	44	46	49	39
20° F.	46	48	48	86	44
Difference	−4	−4	−2	−7	−5
Static Modulus, P.S.I.†					
At 82° F.	533	625	645	670	476
20° F.	640	670	710	1690	590
Difference	−107	−45	−65	−1020	−114
Dynamic Modulus, P.S.I.†					
At 82° F.	830	864	855	1245	774
20° F.	1470	1490	1490	−51000	1350
Difference	−640	−626	−635	−50000	−576
Resonant Frequency, Cps.†					
At 82° F.	3.83	3.91	3.89	4.69	3.70
20° F.	5.1	5.1	5.1	−30	4.9
Difference	−1.3	−1.2	−1.2	−25	−1.2
Resilience, %†					
At 82° F.	63.4	68.6	70.4	51.4	59.8
20° F.	33	32	31	−30	30
Difference	−30	−37	−39	−21	−30
Absorbed Energy, In. Lb./In.³†					
At 82° F.	30.0	29.4	30.0	20.5	33.8
20° F.	16.8	16.3	16.9	1.7	17.2
Difference	−13.2	−13.1	−13.1	−18.8	−16.6

*A plus or a minus sign indicates whether the value is increased or decreased by lowering the temperature.
†Determined on Yerzley oscillograph with specimen loaded to 100 p.s.i.

The static moduli at 82° F. paralleled the 10-second Shore hardness. The dynamic moduli at 82° F. of the ester stocks were greater than the corresponding static moduli by differences ranging from 33% for high thiuram Stock *C* to 63% for no-sulfur Stock *E*. Changing from ester softeners to coumarone-indene softener increased the percentage difference between the static and dynamic moduli from 33 to 86%.

The stocks possessed substantially different resiliences at 82° F. The high thiuram Stock *C* had the highest resilience, followed closely by low thiuram Stock *B* and, with increasing differences, by thiazyl Stock *A* and no-sulfur Stock *E*. Stock *D* with coumarone-indene softener had a much lower resilience than the corresponding Stock *C* with ester softeners.

The choice of accelerator had little effect on absorbed energy at 82° F.; Stock *E* was slightly better than Stocks *A*, *B*, and *C*. However choice of softener did make a difference; Stock *D* absorbed only two-thirds as much energy as Stock *C*.

When the mechanical tests were performed at 20° F., all stocks exhibited higher values for instantaneous hardness, 10-second hardness, static modulus, dynamic modulus, and resonant frequency, and lower values for resilience and absorbed energy than they did at 82° F. The precision of most of the dynamic results, i.e., dynamic modulus, resonant frequency, and resilience, was not

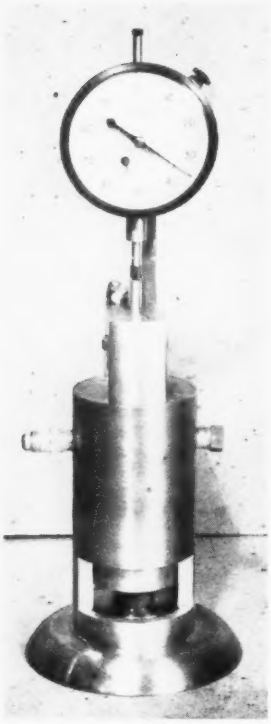


Fig. 3. Compressometer Used for Stress Relaxation Tests

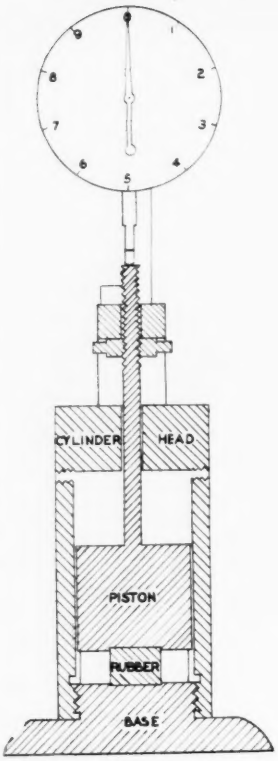


Fig. 4. Cross-Section of Compressometer

so good as at 82° F. because the measurable portion of the oscillatory tracing on the recording drum consisted of less than three cycles. Actually only ½-cycle was obtained with Stock *D*.

Thiuram Stocks *B* and *C* did not excel in resilience over thiazyl Stock *A* and no-sulfur Stock *E* at 20° F. as they did at 82° F. Stock *D* suffered a far greater change in mechanical properties due to lowering the temperature than did Stock *C*.

Rheological Properties

The rheological properties studied in this investigation were compression set, stress relaxation, and drift. These properties are particularly significant for stocks to be used in gaskets and resilient mountings since they are related to the service life of these items.

Evaluation of Compression Set

The compression sets of the stocks after being held at 30% deflection for 1, 2, 3, 4, 5, 7, 9, 12, and 14 days at 194° F. were determined in accordance with ASTM Method B (8). Separate specimens were used for each determination.

Evaluation of Stress Relaxation

The stress relaxation of the stocks during 14 days at 194° F. was measured with an instrument recently devised by the senior author and called a compressometer. A photograph of the compressometer is shown in Figure 3 and a sketch of its cross-section in Figure 4. The compressometer contained an air-operated piston which compressed the specimen to an extent dependent on the stiffness of the rubber and the air pressure on the piston. The rubber specimen was the standard Yerzley specimen, a right cylinder, ½-inch in height and ¾-inch in diameter. There was a depression, 1/64-inch deep and ¾-inch in diameter, in the center of the bottom face of the piston

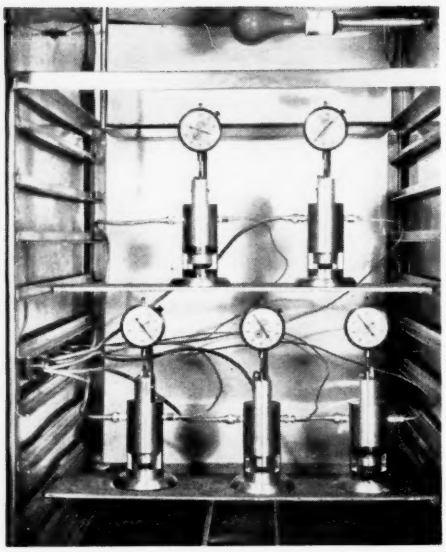


Fig. 5. Arrangement of Compressometers in Oven

and in the center of the base plate to facilitate positioning the specimen and to prevent the specimen from slipping on the bearing surfaces when it was compressed.

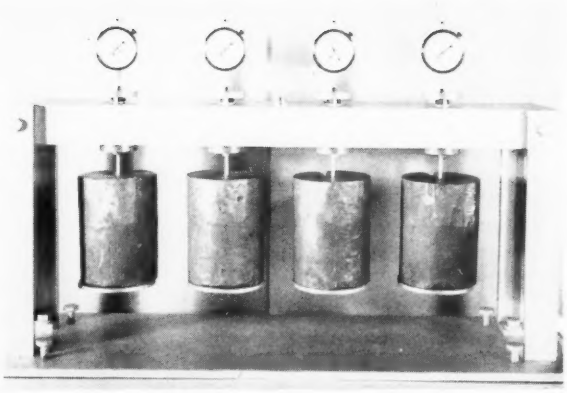
The cylinder wall and the piston had a smooth finish. The radial clearance between cylinder and piston was 0.0008-inch, which reduced friction sufficiently to allow the piston to fall under its own weight, but limited the obtainable air pressure to about 50 p.s.i. because of leakage past the piston.

The piston connected to a rod which passed through the cylinder head with 0.0008-inch radial clearance and through a hole in a cross-bar bolted to the cylinder head. The rod was threaded from the point where it cleared the cylinder head to its end. The spindle of a dial micrometer gage bore on the flat end of the piston rod. The gage was graduated in mils to indicate the slightest movement of the piston rod.

A knurled nut was located on the threaded piston rod between the cylinder head and the cross-bar. The deflection of the specimen was maintained at the desired value by adjusting the knurled nut against the cross-bar before the air pressure was released. The specimen could also be deflected to the desired value without the use of air pressure by tightening the knurled nut against the cross-bar.

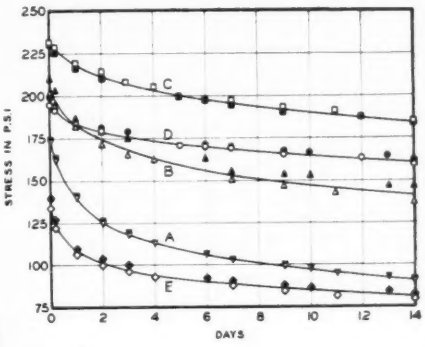
When it was desired to determine the recovery stress exerted by the compressed rubber, the air pressure in the cylinder was increased until the micrometer gage showed a downward movement of the piston. About the first mil downward movement was due to the elasticity of the various metal parts holding the piston in position and therefore was ignored. When the entire recovery stress of the rubber was in equilibrium with the air pressure, a deflection between one mil and three mils showed on the dial gage. The exact point of equilibrium could easily be found with a little experience since the rate of downward movement of the piston with rising air pressure suddenly increased when the point of initial equilibrium was passed. The effective area of the piston was five times the area of the rubber specimen; so the recovery stress exerted by the rubber in pounds per square inch was five times the air pressure at equilibrium. In this connection it should be mentioned that the weight of the piston and attachments, 1.2 pounds, was acting on the specimen when the dial gage was adjusted to zero before the specimen was compressed as well as during the meas-

Fig. 6. Equipment for Introducing and Measuring Air Pressure in Compressometers



(Above)
Fig. 7
Apparatus
for Drift Tests

(Right)
Fig. 10. Effect of Aging at 194° F. on Recovery Stress of Specimens Compressed 30% of Their Initial Height



(Left)
Fig. 8. Close-Up of Apparatus for Drift Tests

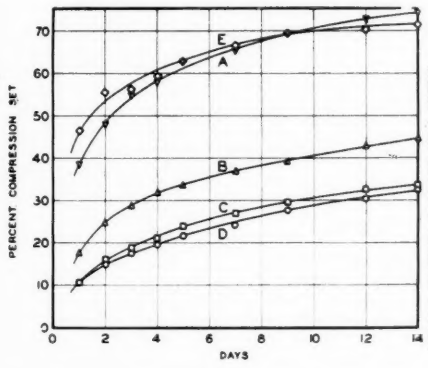


Fig. 9. Effect of Aging at 194° F. on Compression Set of Specimens Compressed 30% of Their Initial Height

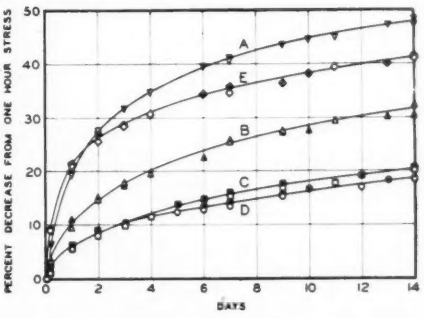


Fig. 11. Effect of Aging at 194° F. on Stress Relaxation of Specimens Compressed 30% of Their Initial Height

urements of recovery stress and therefore was neglected when the recovery stress was calculated.

The stress relaxation tests were conducted at 194° F. in a circulating-air oven having a glass window in its door. The arrangement of the compressometers in the oven is shown in Figure 5; the air pressure gage, the valve arrangement on the manifolds, and the compressed gas tank appear in Figure 6. The pressure gage was connected through a manifold to the respective compressometers, not to the incoming air lines.

The specimens were conditioned in the respective compressometers for two hours before compressing and for one hour after compressing to 30% deflection. The initial measurements of recovery stress were then made. The relaxation of the stress was followed for two weeks while the specimens were maintained at 30% deflection. The results are expressed both as the recovery stress at any time and the percentage decrease from the one-hour value. The tests were performed in duplicate.

Evaluation of Drift

Drift was measured over a period of 24 hours at 82° F. and over a period of 14 days at 194° F. The first test was performed with the Yerzley oscillograph using the standard Yerzley specimen. A load of 44.1 pounds, equal to a compressive stress of 100 p.s.i., was applied to the specimen. A recording was made of the deflection of the specimen at various times in the usual manner. The drift of the specimens at 82° F. was expressed as the actual drift in inches and as the percentage drift from the height of the loaded specimen taken 15 seconds after applying the load. This test was performed in duplicate on each stock, and the results were averaged.

Drift at 194° F. was measured on the Yerzley speci-

men under a dead load of 50 pounds, corresponding to a compressive stress of 113.3 p.s.i. The equipment, shown in Figure 7, included a base with leveling screws upon which was mounted a cast aluminum channel bar by means of four legs of aluminum angle bar. The top face of the channel bar formed the lower bearing surface for the four rubber specimens which were compressed between this surface and round aluminum plates. The specimens were constrained from slipping sidewise on the bearing surfaces by 1 64-inch depressions in the surfaces. The depression in the channel bar surface may be seen in Figure 8. This illustration also shows the pull rods by which the downward force of the lead weight was applied to the round plate, and the dial micrometer gage used for measuring the downward travel of the round plate when a rubber specimen is being compressed. The weight of the top round plate, the pull rods, and the lower round plate, which completed the clevis arrangement for transmitting the downward force of the lead weight to the specimen, was 0.5-pound. This weight was acting on the specimen when the dial gage was set to zero and, of course, was still acting when the lead weight was applied. It was neglected in calculating the stress causing drift.

The drift testing at 194° F. was done in a circulating-air oven with glass windows in the doors so that the dial gages could be observed conveniently. The specimens were given a warm-up period of two hours before being compressed by the 50-pound weights. The drift of the specimens at 194° F. was expressed as the actual specimen height in inches at various times and as the percentage decrease from the height measured one hour after loading. Two drift tests were performed on each stock.

Results of Tests

The compression set data are plotted in Figure 9. It appears from these curves that much lower compression set can be obtained with thiuram acceleration (*B*, *C*, and *D*) than with thiazyl acceleration (*A*) or no-sulfur acceleration (*E*). It is noteworthy that compression set was not affected by changing the softeners from a blend of esters (*C*) to a coumarone-indene liquid polymer (*D*).

The stress relaxation data are plotted in Figure 10 from the standpoint of actual stress values and in Figure 11 from the standpoint of per cent. decreases in stress. The clear symbols and black symbols on each curve are the respective data from duplicate runs. Stock *C*, containing increased thiuram content, lowered sulfur content, and ester softeners, was outstanding for initial (one hour) recovery stress and lost only 20% of its initial value during 14 days at 194° F. Stock *D*, similar to Stock *C* except for the softener, also had a high initial recovery stress and lost only 18% during 14 days' aging. A high initial recovery stress was exhibited by Stock *B* containing low thiuram acceleration, but this stress decreased more rapidly with time so that it had lost about 32% of its initial value during 14 days' aging. Stock *A* with thiazyl acceleration and especially Stock *E* with no-sulfur acceleration had low initial recovery stress and suffered a considerable loss in recovery stress during aging. The curves for percentage stress relaxation of the five stocks stand in about the same relation to each other as the curves for compression set in Figure 9.

The results of the 24-hour drift tests at 82° F. are given in Table 5. The initial heights of the loaded specimens, except for the coumarone-indene stock, reflect the stiffness of the respective stocks and seem to indicate, in an inverse manner, the percentage of drift to be expected. In other words, where state of cure is the only variable, higher state of cure corresponds to greater stiffness and less drift. High thiuram Stock *C* exhibited the least drift, followed in order by low thiuram Stock *B*, thiazyl Stock *A*, and no-sulfur Stock *E*. Changing the softener from esters to coumarone-indene liquid polymer caused a substantial increase in apparent drift. The term, apparent drift, is used because the considerable difference between the instantaneous and 10-second Shore hardnesses of Stock *D* in Table 4 suggests that the elastic compression of this stock was not fully attained in 15 seconds. Therefore the increase in deflection of this stock between 15 seconds and 24 hours after loading was probably not entirely due to the plastic effect.

TABLE 5. RESULTS OF DRIFT TESTS AT 82° F.

Stock	Initial Height of Loaded Specimen* Mils	Drift in 24 Hours from Initial Loaded Height Mils	Drift in 24 Hours from Initial Loaded Height %
A	394	14	3.6
B	405	11	2.6
C	408	8	1.8
D	418	20	4.7
E	375	26	6.9

*Initial height of loaded specimens was measured 15 seconds after loading. Initial height of all specimens unloaded was 495 mils.

The results of the 14-day drift tests at 194° F. expressed as the actual loaded heights of the specimens in inches are given in Figure 12, and the results expressed as the per cent. decreases from the heights one hour after loadings are given in Figure 13. The clear symbols and black symbols on each curve are the respective data from duplicate runs. It will be noted from the curves showing specimen heights at various times that high thiuram Stock *C* was initially the stiffest and underwent the least change of height during the 14-day period at 194° F. In order of decreasing initial stiffness and increasing change of height stood low thiuram Stock *B*, thiazyl Stock *A*, and no-sulfur Stock *E*. Substitution of coumarone-indene softener (*D*) for the ester softeners (*C*) brought about a slight decrease in initial stiffness and a slight increase in change of height.

The percentage drift curves in Figure 13 showed high thiuram Stock *C* to be much superior to the other stocks. Low thiuram Stock *B* was intermediate, and thiazyl Stock *A* and no-sulfur Stock *E* were poor in this respect. The coumarone-indene stock was as good as the corresponding ester stock. This test rated the five stocks in essentially the same order for suitability as did the compression set test.

Discussion of Results

The purpose of this investigation was primarily to determine the efficacy of tetramethyl thiuram monosulfide as the accelerator for gasket stocks and resilient mounting stocks made from nitrile rubber. The results of the tests will therefore be reviewed first from the standpoints of these applications.

The basic requirement for gaskets is that they shall seal against fluid pressure. In order to fill this requirement they must maintain indefinitely after compression a recovery stress against the restraining surfaces in excess of the fluid pressure. The stress relaxation curves in Figures 10 and 11 demonstrate that for both initial value and maintenance of recovery stress, thiuram acceleration is better than thiazyl and no-sulfur accelerations, and high thiuram and reduced sulfur contents are preferable to normal quantities of these ingredients.

The strength properties obtained with high thiuram acceleration are believed to be adequate to obviate damage by crushing, cutting, or gouging, especially if coumarone-indene liquid polymer or similar softener is used in lieu of esters. However esters or similar softeners should be used if the gasket must be soft at low temperatures.

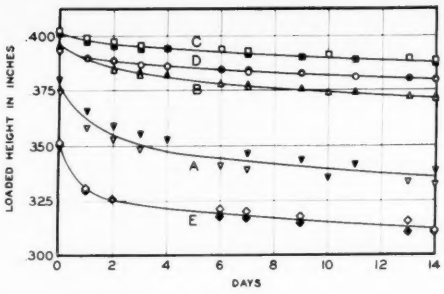


Fig. 12. Effect of Aging at 194° F. on Height of Specimens under Compressive Stress of 113.3 P.S.I.

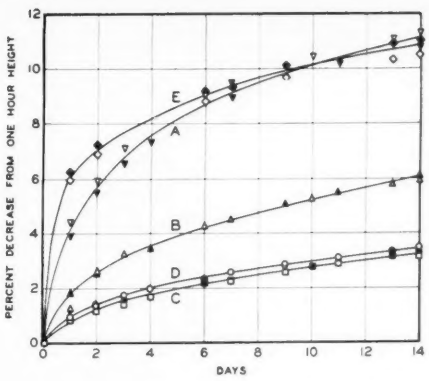


Fig. 13. Effect of Aging at 194° F. on Drift of Specimens under Compressive Stress of 113.3 P.S.I.

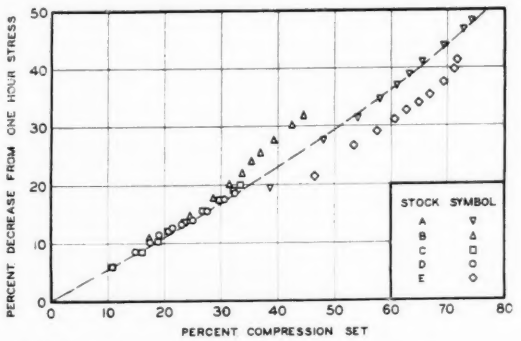


Fig. 14. Relation between Compression Set and Stress Relaxation

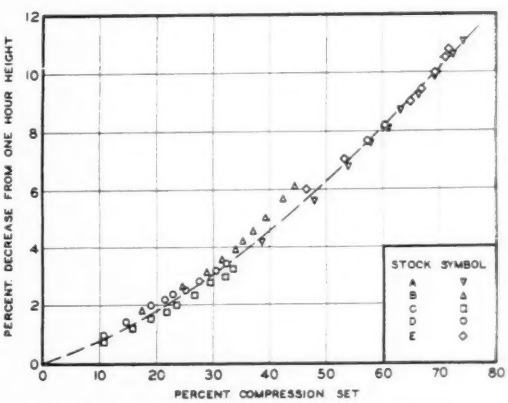


Fig. 15. Relation between Compression Set and Drift

The basic requirements for resilient mountings is that they shall be resilient and shall be capable of absorbing impact energy. The data in Table 4 show that thiuram acceleration with ester softeners gives outstanding resilience at 82° F., and energy absorption about equal to that given by the other accelerations studied. Another important requirement for resilient mountings is that they shall not drift under load, thereby permitting the supported equipment or machinery to settle. According to Table 5 and Figures 12 and 13, thiuram acceleration yields minimum drift, both immediate at 82° F. and for an extended period at 194° F. The strength properties of the thiuram stocks, at least those of the low thiuram stock, seem to be adequate for most mounting applications. It is evident from the tests at 20° F. that these stocks should not be softened with coumarone-indene liquid polymer for stability of mechanical properties at low temperatures.

Thiuram acceleration is definitely not indicated for nitrile rubber stocks to be used in applications where strength properties are of the greatest importance, such as oil hose covers. Thiazyl acceleration or the expensive no-sulfur acceleration is preferable for these stocks.

Relations between Rheological Properties

It is customary in most rubber laboratories, when developing stocks for gasket applications, to assume that stress relaxation is proportional to compression set and to evaluate stress relaxation by means of the ASTM compression set test at constant deflection. The reason for this practice is that the compression set test utilizes simpler and less expensive equipment than any stress relaxation test devised to date (9), including the test described in this report. The technical literature, however, yields little information to justify the assumption of proportionality between these properties.

Similar circumstances prevail when stocks for compression mountings are being developed. In this case proportionality is assumed between drift and compression set, and the ASTM test for compression set under constant load (8) is used to evaluate drift. Sometimes the compression set test at constant deflection is used instead, since it has the advantages of greater precision, and smaller, lighter, and less expensive equipment, although it does not resemble the service condition so closely. A limited amount of data has been published which indicates some degree of correlation between compression set at constant deflection and drift in shear (10).

The data on compression set, stress relaxation, and drift obtained in the course of the foregoing investigation of accelerators can be used to determine to what extent compression set at constant deflection can be used as a criterion of stress relaxation and drift.

Values of compression set were read from the curves in Figure 9 at one-day intervals at the beginning and at longer intervals as the curves leveled off. The compression set values were plotted against the corresponding stress relaxation values read in a similar manner from the curves in Figure 11, and against the corresponding drift values read in a similar manner from the curves in Figure 13. The former plot is shown in Figure 14, and the latter plot in Figure 15.

The data plotted in Figure 14 demonstrate that a correlation exists for each stock between stress relaxation and compression set, but that the data for the individual stocks do not fall on a common curve. The greatest difference was between Stocks *B* and *E*. For example, when these stocks both had a stress relaxation of 30%, Stock *B* had a compression set of 42% and Stock *E* had a compression set of 59%. Notwithstanding the discrepancies noted, compression set seems to be a fair criterion of stress relaxation and could be used to evaluate this property from a comparative standpoint, at least when preliminary testing of a series of stocks of the type examined here is being performed.

According to Figure 15, compression set is a more

dependable criterion of drift than it is of stress relaxation since all of the points agree quite well with a common curve in this case. This good correlation is not surprising in view of the fact that deflection at any time after loading is a combination of recoverable elastic effect and non-recoverable plastic effect (10). Any increase in deflection with time, i.e., drift, must reflect only the plastic effect since the deflection due to the elastic effect does not change with time after a short period for accomplishment of this deflection. The fact that the compression set test likewise measures only the plastic effect is self-evident.

The agreement of the respective data with the tentative curves in Figures 14 and 15 might have been better if instead of following ASTM Method B, the compression set test had been performed with specimens having the same dimensions as those used in the stress relaxation and drift tests, and if the compression plates had shallow depressions to prevent sidewise slippage of the specimens.

Before concluding this discussion of the relation between rheological properties, it should be emphasized that compression set can be correlated with stress relaxation and drift only when these properties are expressed as percentages, not when they are expressed in dimensions. Dimensional stress relaxation and dimensional drift involve the static compression modulus. In the case of two gaskets with the same per cent. stress relaxation which are compressed to an equal extent in service, the stiffer gasket will exhibit the greater actual decrease in recovery stress. Likewise, in the case of two mountings with the same per cent. drift which are supporting equal loads in service, the stiffer mounting will exhibit the greater actual decrease in height.

Summary of Results

The important results of this investigation may be summarized as follows:

(A) When tetramethyl thiuram monosulfide is used as the accelerator in a nitrile rubber stock, a higher state of cure is obtained than when dibenzothiazyl disulfide or tetramethyl thiuram disulfide with mercaptobenzothiazole and selenium is used as the accelerator. This point is evidenced by enhanced values for extension modulus, hardness, static compression modulus, and resilience, and low values for compression set, stress relaxation, and drift. These properties are changed further in the directions indicated by the use of a higher ratio of tetramethyl thiuram monosulfide. Concomitant with the improvement in these properties, tensile strength, ultimate elongation, and tear resistance are decreased.

(B) It has been shown for five nitrile rubber stocks that compression set at constant deflection may be regarded as a moderately satisfactory criterion of stress relaxation and as a good criterion of drift, under similar circumstances of temperature and deflection.

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(*To be continued*)

EDITORIALS

Industry Outlook for 1949

ACCORDING to year-end statements of rubber industry executives, the Rubber Manufacturers Association, Inc., and the United States Department of Commerce, the outlook for the industry for the year 1949 may be described as good. The third postwar year in which the consumption of new rubber in the United States exceeded one million tons and the total value of goods manufactured amounted to 3½ billion dollars ended with increasing acceptance of the belief that the rubber industry has moved on to a "higher plateau of activity" which will continue for the next several years.

Activity in the rubber industry, of course, is dependent on business conditions in general, but, as Herbert E. Smith, chairman of the board of United States Rubber Co., pointed out in his year-end statement, four major influences are at work to keep business at a high level. These influences are: (1) full employment at high wages, giving the American people great purchasing power; (2) heavy expenditures by the government to finance the defense and European programs and other government activities; (3) Large expenditures by manufacturers and other business groups to expand and modernize buildings and equipment; (4) shortages in some durable lines, accentuated by government purchases.

One thing Mr. Smith did not mention in his general statement, but which is amply illustrated in the latest issue of that company's own publication, *Us*, is the contribution of research to the maintenance of high-level productivity in the rubber industry. Research by U. S. Rubber, which may be taken as representative of research by most companies in the industry, is the means by which progress is made by virtue of the development of new products and the improvement of old ones. Like the rest of the industry, U. S. Rubber has been devoting much attention to diversification and is now a producer of plastics products such as radio cabinets, many types of textiles and fabrics including fabrics for the clothing industry, and such chemical products as insecticides and perfumes, in addition to its regular rubber goods line.

The American tire industry can look forward to 1949 with the expectation that an estimated 2,000,000 more tires will be sold during the year than in 1948, John L. Collyer, president of The B. F. Goodrich Co., said in his year-end statement. The country's high rate of economic activity and increasing population generate an ever-growing demand for highway transportation. The number of cars on the road is increasing steadily as new car sales continue at a high rate and the older cars are kept in service far beyond their prewar life expectancy, he added.

The Rubber Manufacturers Association emphasized that the long-term trend toward increased consumption of rubber both in existing and in new products continued in virtually all lines. This was notably true in mechanical rubber goods and in the rapidly growing field of latex foam products. Nor was there any apparent interruption in the long-term trend toward the replacement by rubber of certain competing materials such as leather, steel, and textiles in such applications as footwear, containers, and conveying mechanisms and in garments and coverings.

There will be no shortage of rubber to interfere with high-level production in the rubber industry, according to Everett G. Holt in the Department of Commerce's "Industry Report—Rubber" for November. Production capacity for natural rubber has been revised upward to 2.1 million tons a year, and *actual* production at the rate of 1.9 million tons a year within the next two or three years is seen as a possibility. With 350,000 to 600,000 long tons a year of synthetic or chemical rubber available and with about 200,000 tons of this to be in the form of low-temperature GR-S by the latter part of 1949, both the amount and the quality of new rubber should be increasingly satisfactory.

World rubber consumption for 1948 is estimated at 1.9 million tons, with 1.1 million tons consumed in the United States. In spite of the possibility of future total world production of between 2.1 and 2.5 million tons a year, Mr. Holt suggests that no world surplus of rubber will be realized during the next ten years, unless in some temporary period of unusual trade depression.

The rubber industry is still a young industry. From 1840 to date, except for the 1929-34 period, there never was a time when rubber was in ample supply for a span of several years, and unfortunately the depression years were the most unpropitious time for an ample supply to occur because of the worldwide economic calamity. Now, with world production of natural rubber back near the prewar peak, around 350,000 tons of chemical rubber had to be used to balance 1948 supply and demand exclusive of U. S. Government stockpiling; rubber supplies are ample only because chemical rubbers are available, Mr. Holt points out.

If we may be excused for drawing so heavily on the Department of Commerce report we would like to conclude this discussion with comment from it regarding whether the rubber used in the long term will be natural or chemical rubber. It may be that, just as petroleum has grown to rival coal as a source of energy in the United States without preventing a growth in the consumption of coal, chemical rubber may grow to equal natural rubber in tonnage consumed without preventing increased consumption of natural rubber. Use of natural rubber will be maintained best if the supply available is all that is needed for stockpiling and for consumption at competitive prices. Use of chemical rubbers would be stimulated if a scarcity or high price of natural rubber resulted from political troubles or from other causes.

With so many factors in its favor at the beginning of the year, it seems more than likely that the rubber industry in 1949 will equal its record for previous postwar years.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Firestone Plastics Co.'s Pottstown, Pa., Plant[1]

THE Firestone Tire & Rubber Co., as a major supplier of automotive rubber products to the motor car industry, became interested in the molding of plastics parts several years before the late war, when it was noted that the manufacturers of automobiles were turning to plastic materials, mostly phenolic resins, at that time, for use in their products. Activities in the field of molding plastics items have continued, and, in addition, the Firestone company had made considerable progress in the use of vinylidene chloride resins as monofilaments for upholstery applications before World War II. Known as Velon, these monofilaments were in the form of a rattan of relatively large cross-sectional area having a width of about ⅛-inch and a thickness of 0.02- to 0.03-inch. Other filaments of 0.012-inch in diameter were used for insect screening, an application which took almost all of the production of the company during the war period. Other military uses for the material included tents, mesh for innersoles for military boots and for battery separators, target cloth, and collapsible stretchers.

Before the war Velon had shown great promise for use in upholstery and drapery fabrics and had been utilized by several railroad, bus, air, and steamship lines. A fine monofilament suitable for woven fabrics was finally turned out, and its excellent characteristics encouraged Firestone to launch a development and production program that led to the incorporation of the filament into certain high-grade fabrics.

Velon plastic materials are now being marketed in three major forms for product fabricators. As a film, Velon is used for rainwear, table cloths, window and shower curtains; as an embossed or glossy covering in heavier gages, it is applicable in luggage, handbags, upholstery, and book binding; and, as a filament, it is utilized in screening, special-purpose upholstery, and textiles.

The Firestone Plastics Co., organized in September, 1947, with Roger S. Firestone as president, recently consolidated its activities, including sales, at the Pottstown, Pa., plant. All production activities in connection with the manufacture of Velon filament, sheeting, and film are located at this plant under the direction of E. T. Hanley, formerly in charge of foreign plant manufacturing and wartime head of the company's extensive synthetic rubber production program.

Elmer H. French, general sales manager, and his staff now handle the sale of all Velon filament, sheeting, and film from the Pottstown plant.

Operations at the Pottstown plant are concerned with the calendering and extrusion of the vinyl chloride copolymer resin, and a plant for the production of this resin has been constructed at Pottstown during the last year. Two calender production lines complete with electronic controls, designed by Firestone engineers and incorporating Farrel-Birmingham's latest Z-type calenders for the high-speed production of plastic sheeting and film have been installed. National Rubber Machinery extruders with additional equipment for quenching and stretch-orienting the plastic filaments are used for the production of Velon yarns and rattan-type filaments.

Development laboratories for the work on new products and improvement of existing ones are under the direction of Frank J. Groten.

The Resin Plant

The vinyl chloride copolymer resin plant, which is quite similar in design and operation to the synthetic rubber plants about which so much has been written during the last few years, is located in the rear of the main building in Potstown which houses the plastics fabricating operations and also a tire plant which occupies about half of the main building.

The monomers are received by tank car, stored in tanks in the rear of the resin building, and purified before being measured out for polymerization. Two production lines are available for the emulsion polymerization of the Velon resins, each consisting of five polymerization tanks, two tanks for removing unreacted monomer, a tank for blending the resin latex, and a coagulating tank combined with an overflow tank. (See Figure 1.) After the resin latex has been coagulated, the major part of the water is removed in basket centrifuges, and the remaining moisture taken care of in Raymond flash driers, followed by cyclone drying towers. The resin powder is then bagged for storage and future use.

Polymerization is carried out with a minimum of emulsifying agent at about 100° F. By keeping the emulsifier content low the coagulation and washing of the resin are made easier.

Production of Velon Filament

Resin for filament production is compounded wth plasticizer, color, stabilizer, etc., in a cone blender. The compounded

[1] This article appears as a result of a visit to this plant by our Editor.

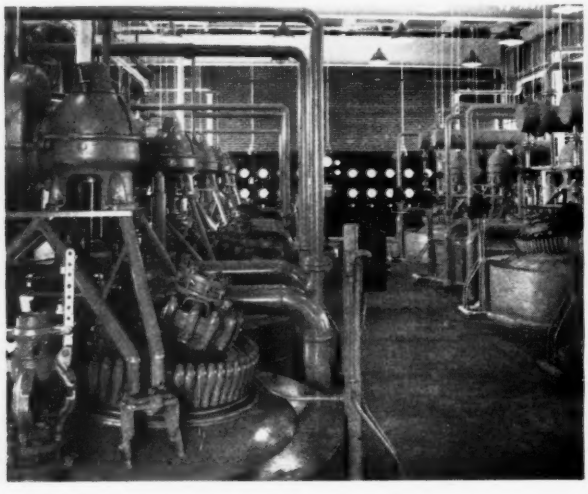

Fig. 1. A View of the Two Lines of Polymerization Reactors in the Velon Resin Plant

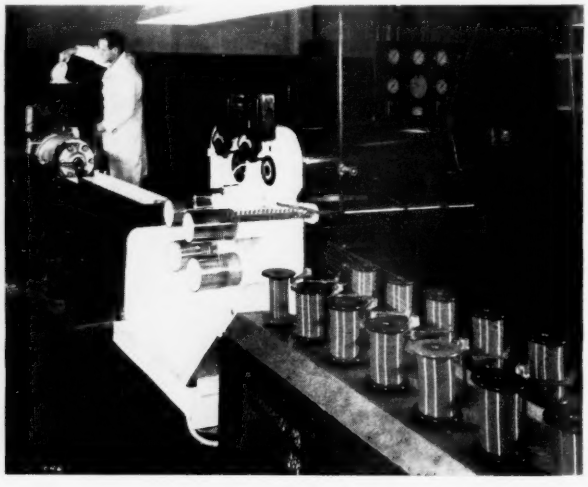

Fig. 2. Velon Filament Production Line: *(Left to Right)* Extruder, Quenching Bath, Stretching Apparatus, and Spooler

resin is fed into the hopper of National Rubber Machinery extruders, where under carefully controlled temperature conditions (about 350° F.) filaments, 12 in number, are produced in continuous lengths. The molten filaments are quenched in a bath of cold water and assume an amorphous or non-crystalline, supercooled condition. (See Figure 2.) In this state they are ductile enough to be stretched mechanically to about four times their original length to produce crystalline monofilaments. Tensile strength is increased about 1,000%.

Velon filaments and tape are wound around spools or cones holding from one to two pounds. Filaments are available in diameters from 0.005- to 0.030-inch and in 54 different colors including greens, yellows, etc. The larger 0.015-inch size is used mostly for screening; for weaving fabric for automobile, bus, and train seats gages between 0.010 and 0.012 are used. For use in combination with other textile fibers for upholstery fabrics, 0.008-inch diameter Velon is the most popular size. Diameters of 0.005-inch are finding application in the manufacture of marquisette curtain material and material for draperies and upholstery which approach the necessary physical properties of competitive textile fabrics for this application.

Other applications of Velon monofilaments include uses in millinery, footwear, and decorative fabrics. Much development work has been done on handling Velon in various weaving operations in cooperation with a number of textile manufacturers.

PROPERTIES OF VELON MONOFILAMENTS

Tensile strength	40,000 p.s.i.
Tenacity	1.8 gms./denier
Elongation at break	20 to 30%
Flexural properties	Flexible to —40° F.
Specific gravity	1.68 to 1.75
Refractive index, nD	1.60 to 1.63
Softening point	240 to 280° F.
Resistance to heat	Shrinks above 170° F.
Thermal conductivity	2.2×10^{-4} cal., sec./cm² C.°/cm.
Water absorption, 24-hour immersion	Less than 0.1%
Burning rate	Self-extinguishing
Effect of age	None
Effect of sunlight	Darkens slightly
Effect of chemicals	Generally resistant
Effect of fungus, mildew, etc.	Not attacked
Clarity	Translucent to opaque
Color range	Wide

Velon yarn and fabrics have outstanding resistance to aging in air and sunlight, water and mildew and fungus, are resistant to most chemicals, and have very good dimensional stability. The material is self-extinguishing and therefore presents no fire hazard. Properties of Velon monofilaments, as supplied by the Firestone Plastics Co., are listed in the table above.

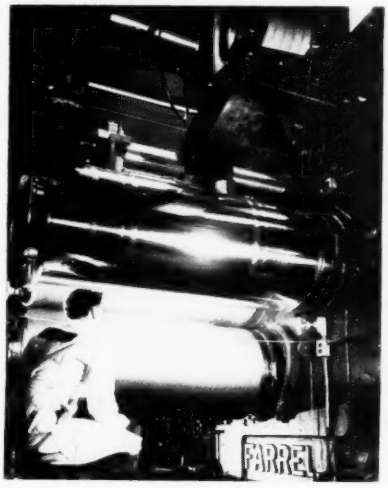

Fig. 3. A View of One of the Z-Type Calenders, Looking up from beneath the Calender Rolls

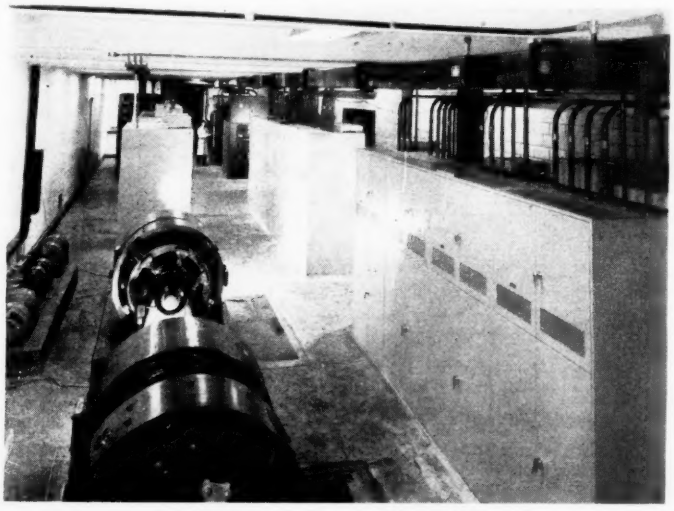

Fig. 4. Control Room for Calender Trains

Sheeting and Film

For the manufacture of film and sheeting, Velon resin is mixed with plasticizer in blend tanks in which the plasticizer is added to the powdered resin from spray nozzles at the top of the tank and distributed throughout the resins by paddle agitators. Further compounding is done in a Banbury mixer where colors, stabilizer, pigments, and chemical ingredients are added and mixed with the resin. The compound is given additional milling on open mills at temperatures between 275 and 325° F. before calendering. An electronic metal detector is installed on the conveyer between the last warm-up mill and the calender to prevent damage to the calender rolls.

Calendering of Velon film and sheeting is done on Farrel-Birmingham Z-type calenders equipped with the most modern electronic controls. The Z-type calender maintains heat balance to a greater degree than the vertical stack-type calender by the "nesting" of the rolls, and temperature variation is further reduced by the Z arrangement of the rolls which reduces the exposure of the calendered material between successive passes to 90 degrees. A view of one of these calenders is given in Figure 3. Some idea of the extent of the electrical equipment involved for handling and regulating the power for these calender trains may be gained from Figure 4, which shows the calender control room at the Pottstown plant.

For embossed sheeting one of the regular rolls of the calender is replaced by an engraved roll. Almost any type or design or grain can thus be introduced into the sheeting as a part of the calendering operation. For certain uses this material goes through the further process of printing.

Film can be made in thicknesses from 0.003-inch to 0.020-inch in any color and may be opaque, semi-opaque, or translucent. Sheeting, termed "Upholstery Flex" and "Novelty Flex" by Firestone, is made in thicknesses from 0.012- to 0.020-inch. The film is made in a wide range of colors, including metallics, and in widths of 30, 48, and 54 inches. The sheeting, also available in almost any color, may in addition have embossed, suede, or printed surfaces.

Velon film and sheeting are reported to have excellent abrasion resistance, toughness, high tensile strength, and tear resistance.

Firestone sells Velon film to converters who in turn fabricate it into consumer goods, a partial list of which follows:

Appliance covers; aprons (household

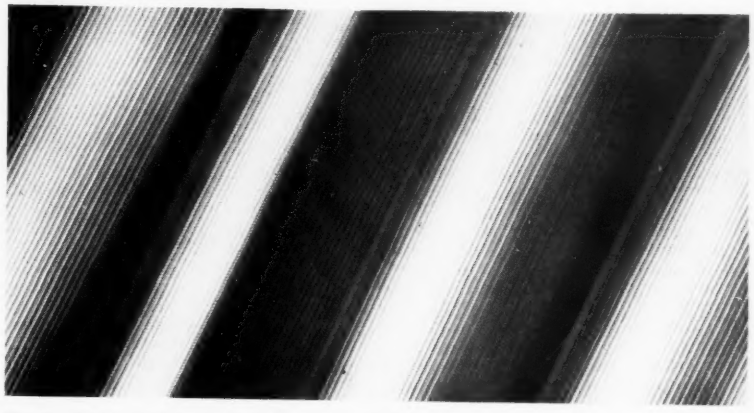

Fig. 5. Light and Shadow Throw into Relief the Texture Contours of Firestone's New Decorator-Designed Velon Film for Draperies and Furniture Covers

and industrial); baby panties; cosmetic pouches; curtains (bath, kitchen, and cottage); dental and surgical aprons; disposable diaper holders; drapes; dress shields.

Fan covers; food bags; food dish covers; garment bags; golf club covers; hat linings; kit liners; lingerie bags and covers; maternity wear items, mattress covers; military cap covers; as well as novelty headwear.

Pillow and blanket bags and cases; place mats; pocketbook liners; raincoats and caps; sheeting for cribs, etc.; shoe bags; shower curtains; surgical wet dressings; sweat bands; tablecloths; instrument covers; umbrellas; utility bags and waterproof bed spreads.

Velon sheeting embossed with a grain design or polished as a patent leather can replace leather in numerous applications. It has such advantages as being scuff-resistant, non-absorbent, and easily cleaned. Its abrasion resistance is several times that of leather as measured in laboratory tests according to Bureau of Standards techniques. Aging properties are excellent.

Firestone supplies Velon sheeting to handbag manufacturers and to the luggage field and upholstery trade. Other uses include transportation seating and card table and desk tops.

SPE National Conference Program; Reports on Sections

THE Society of Plastics Engineers has announced the final program of papers to be presented at its annual National Technical Conference, to be held January 19 to 21 at the Bellevue-Stratford Hotel, Philadelphia, Pa. Twenty papers, whose abstracts are given below, will be presented at morning and afternoon technical sessions on January 19 and 21, and a morning session on January 20. According to Society President J. H. DuBois, Shaw Insulator Co., the program arranged by Program Chairman R. B. Akin, E. I. du Pont de Nemours & Co., Inc., is exceptionally well balanced. Mr DuBois urged that everyone desiring to be up to date in plastics technology make it his business and pleasure to attend the Conference.

In addition to the paper, valuable technical information will also be gained in the large number of conference rooms surrounding the meeting rooms. These conference rooms have been taken over by technical representatives from all branches of the plastics industry for consultative purposes with attending technicians. The Society will hold its annual meeting on January 20 in conjunction with a luncheon open to all SPE members. The national directors will meet on January 19 to formulate policies and elect officers for 1949.

The titles, authors, and abstracts of the 29 papers to be presented at the technical sessions follow:

WEDNESDAY, JANUARY 19, 1949

Flame-Resistant Cellulose Acetate. The extensive development work done in producing a series of Lumarith XF formulations to give them low flammability without sacrificing other desirable properties of cellulose acetate molding compounds will be described in detail. Incorporating certain plasticizers and modifiers, the first formulations yielded injection molded parts having improved gloss, a high order of surface hardness, good dimensional stability and heat resistance as well as low flammability. They were, however, limited to dark translucent and opaque colors, and in some of these it was difficult to maintain color uniformity. How these disadvantages were overcome by further research, with the use of an improved acetate flake, leading to new formulations which have been used for several commercial products requiring the Underwriters' Laboratory approval, will be disclosed. Burton E. Cash, Celanese Corp. of America, Newark, N. J.

Effect of Composition and Compounding on Processing and Physical Properties of Rigid Vinyls. The paper covers the effect of variations in composition on the softening points and plasticities of Geon rigid vinyls. The effect of plasticizers on these properties will also be included. The relation between plasticity and processing temperatures as well as a rapid method of determining optimum processing temperatures will be discussed.

Slides will illustrate graphically the effects on softening points and viscosities caused by variations in plasticizer content. The composition of the compounds studied has been varied sufficiently to cover quite a range of initial hardness values.

A brief discussion of testing methods used will be included. G. E. Field, B. F. Goodrich Chemical Co., Cleveland, O.

Tuflite—A New Thermoplastic Molding Composition. The development of blends of high styrene Pliolite S6 resin with various rubber-like polymers to produce a family of compounds, known as Tuflite compounds, has brought more closely together the fields of rubber and plastics. Blends of the hard, rigid styrene resin with the characteristic soft rubber have produced materials with many unique properties, available in wide color range. Among these properties are: (1) excellent impact strength combined with rigidity, (2) the ability to absorb loading and produce stocks in a wide range of specific gravity, (3) ease of molding, (4) machinability on wood or metal working equipment, and (5) post-forming ability. These properties and the possibilities of "tailor-making" a Tuflite compound to meet a desired requirement will be dealt with. Harold S. Sell, Goodyear Tire & Rubber Co., Akron, O.

Polymers of Monochlorotrifluoroethylene. These interesting new materials, developed during the war for the Manhattan District, are now being produced by M. W. Kellogg Co. under the trade names KEL-F and KEL-FLO. Their properties, fabricating techniques, and uses will be discussed. High polymeric trifluorochloroethylene (KEL-F) is a chemically inert thermoplastic which can be molded by conventional methods at from 250 to 300° C. It is insoluble in common organic solvents and is swollen at elevated temperatures by halogenated solvents. It is inert to aqueous acids, bases, and oxidizing agents. Its electrical losses are low, and specific resistance is high. Trifluorochloroethylene polymers in the 1000-2000 range of molecular weight (designated KEL-FLO) are oils or waxes. They exhibit the same chemical inertness of KEL-F and have some lubricating properties. They can be used as plasticizers for KEL-F. Louis C. Rubin, M. W. Kellogg Co., Jersey City, N. J.

A New Alkyd Thermosetting Molding Composition. A new thermosetting industry molding compound, based on a polyester-type resin, is designated as Plaskon alkyd molding compound and represents the first use of such a resin in materials for hot molding. The new alkyd molding compound embodies several features which make it attractive to molders seeking high-speed production procedures. The compound is extremely fast curing and requires relatively low pressures for molding. It permits the use of less massive, less expensive, but fast-closing equipment. The material molds with surprising ease in equipment operated by air pressure, thus eliminating the need of high-pressure hydraulic systems and heavy-duty accumulators. While the material is in the plastic state during molding, very little pressure is required to flow the material over the mold surfaces. The press must be fast enough to drive the mold parts completely together during the first two seconds after the material has reached mold temperature. In most cases 300 to 310° F. is the optimum operating range. The paper will treat of physical properties, especially dimensional stability, strength, heat resistance, electrical properties, and resistance to chemicals. Molding procedures and mold design will also be described. M. H. Bigelow, Plaskon Division, Libbey-Owens-Ford Glass Co., Toledo, O.

Protective Films from S-Polymers. S-Polymers, a new series of hydrocarbon thermoplastic copolymers, are produced by low-temperature polymerization techniques from styrene and isobutylene. These copolymers have good electrical and physical properties, easy processability, and excellent resistance to the penetration of moisture and gases.

Among a variety of applications which have been investigated, the most interesting appear to be in the field of packaging where the resins' resistance to gas and moisture vapor penetration is very advantageous. Results from a series of tests show that thin films of these transparent plastics very effectively prolong the storage life and minimize the shriveling of fresh fruit. Fresh fruits wrapped in films of S-50 Polymers showed very little, if any, loss in appearance, food value, or edibility after 28 weeks and lost only slightly more than 10% of their original weight. Unprotected fruits were shown by controlled experiments to be relatively inedible in two weeks.

Other applications for S-Polymers include electrical insulation, cast films, modifying agents and processing aids for rubbers and resins, capsules for aqueous and alcoholic solutions, laminates, recording material, and wax modifiers for wax coatings. Raymond G. Newberg, Standard Oil Development Co., Linden, N. J.

Satusply—A New Decorative Surfacing Material. Satusply is the name applied to U. S. Rubber's polyester resin laminations used for decorating surfaces and is one of the lines of resinous products developed at Mishawaka since the war. Belonging to the special class of films made from 100% polymerizable, thermosetting, cross-linked alkyd and vinyl resins, Satusply is the only representative of this class that is sold in continuous rolls. The distinguishing features of Satusply are its continuous length, pliability, and durability. Continuous length is important for the minimizing of joints encountered in decorating long surfaces; while pliability is needed for application to curved surfaces in on-the-job installations. The material has exceptional durability toward dimensional change, the action of corrosive gases, liquids, and solids, and the wearing effect of heat, abrasion, and discoloring light rays. Although a new product, Satusply has proved itself

by actual use, and installations are still performing after more than two years under varying conditions. In construction, Satusply is a union of thoroughly impregnated papers and/or fabrics formed in a manner to resemble reinforced concrete or wire embedded in glass more than to resemble a plywood or laminar thermoplastic. Satusply is available mainly in a 36-inch width and in thicknesses ranging from 1/32- to more than 1/16-inch. It is also believed to be at the threshold of its wide potential utility and is expected to occupy a prominent place in the surfacing industry. R. M. Paulsen, United States Rubber Co., Mishawaka, Ind.

New Approaches in Evaluation of Plasticizers. The importance of plasticizers in the field of plastics moldings, elastomeric extrusions, and films and surface coatings has increased phenomenally with the growth of these industries. The evaluation of plasticizers has in the past been on a purely empirical basis, but a review of recent work reveals that a point has been approached where some predictions can be made as to the compatibility and efficiency of a plasticizer in a new system. The importance of plasticizer compatibility, efficiency, and permanence will be discussed, together with volatility, food tolerance, flammability, weathering, low-temperature flexibility, and availability. Some types of plasticizers most useful with various commercial synthetic resins will be outlined, and samples of plasticized compositions will be displayed. New types of plasticizers will be described, and the steps by which these were developed will be outlined. J. Kenneth Craver, Monsanto Chemical Co., Springfield, Mass.

Plastics Education and Research at Princeton. The educational objectives of the plastics program at Princeton are instruction and research in the application, processing, fabrication, and basic properties of high polymers as engineering materials. At the undergraduate level, introductory class and laboratory work provides fundamental training. There is a growing demand for the four-year engineering Bachelor graduate in the general manufacturing industries. A graduate program of instruction and research is offered to supply the needs of the plastics industry for specialized engineering talent. The curriculum integrates a number of essential graduate courses into a well-rounded plan of instruction in plastics leading to a masters degree in engineering.

The research program, sponsored by the Army Signal Corps and various Navy Bureaus, represents unsolved plastics problems accumulated during the war. Some of the studies in progress are: arc resistance, arc resistant laminates, high K-low loss materials, potting compounds, rheological studies, microwave measurements and measurement methods. Louis F. Rahm, Princeton University, Princeton, N. J.

THURSDAY, JANUARY 20

The Quartermaster Research Program on Plastic and Coated Fabrics. The present status of plastic film applications in items of military supply by the Quartermaster Corps will be considered. Three basic phases of film applications are discussed; namely, clothing, packaging, and protective covers. The discussion of the work on packaging materials will center on specific requirements for the many specific items to be packaged. The basic problems associated with the use of plastic films in items of clothing will be dealt with, and some of the difficulties encountered will be presented for further study. The use of films for equipment covers and the associated problems will be discussed. A general review of other Quartermaster Corps research and development on plastic film will be presented. Warren Stubblebine, Office of the Quartermaster General, Washington, D. C.

The Plastic Materials Manufacturers Association Testing Program. This talk will be largely devoted to showing a technicolor sound movie describing the fundamental work in the basic mechanical properties of plastics being carried on under the PMMA program at MIT. The movie was made by the Society of Plastics Industry so that information regarding the work would be more widely available. The program has entailed the development of methods of test and the development of testing equipment to make possible fundamental analyses of the strength properties of plastics. It is directed toward determining the validity of some of the theories respecting the plastic, non-elastic, behavior of materials as they may relate to plastics. Albert G. H. Dietz, Massachusetts Institute of Technology, Cambridge, Mass.

Styling Molded Plastics. A product is said to be well designed when it has been reduced to its utmost simplification in terms of function and form. A good mold design never comes by chance, nor does a good product design—both are the products of a trained intellect.

Proportion, balance, rhythm, emphasis, harmony, variety, texture, and color are the fundamentals of design, with which the plastics engineer should acquaint himself. Good product design should go hand in hand with good mold design. The products of the design-conscious molder get more than their share of the potential market. Many of the most successful plastic products have been produced from molds that were either simple hobbing jobs or practical machining jobs. A well-designed product increases sales appeal by creating a pride of ownership which increases the value of the product. A good design adds length of life to a product because the product remains interesting for a longer period of time.

Of great importance also is the fundamental fact that good design tends toward the utmost simplification of manufacturing processes and hence to economies in production. The material maker, the mold builder, the molder, the product manufacturer, and the customer all benefit from sound project styling. Donald W. Biklen, Shaw Insulator Co., Irvington, N. J.

Silicones as Mold-Release Agents and Lubricants. After a brief discussion of the history, chemistry, and basic properties of the various forms of silicones, together with their principal applications, three silicone materials widely used as mold release agents will be described and evaluated: a silicone fluid, an emulsion, and a grease-like compound. Most mold lubricants either contaminate the product or break down at molding temperatures, leaving a carbonaceous deposit which necessitates frequent and costly cleaning of molds. It will be pointed out that the silicones' high heat stability (which makes them resist oxidation), their relative inertness and incompatibility with organic material, and their lubricity bring them closer to the specifications of an ideal mold lubricant. W. A. Wiard, Dow Corning Corp., Midland, Mich.

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Surface Finishing of Molds. This paper, profusely illustrated with specially prepared slides, will describe the various methods developed by the watch industry for economically obtaining better surface finishes. Particular emphasis will be laid on machine parts, tools, dies, and molds. An analysis of these finishes and their measurement, and the advantages of higher finishes, will be fully discussed. Divided into three parts, the paper will first explain the "what" of finishes—their language and measurement methods; then the "why"—the increased wear resistance, lower friction, and superiority of parts produced from higher finished machine components and molds; and finally the "how" of finishes, which will include a discussion of their economics, machining methods, and a complete demonstration of the new diamond abrasives used for producing higher finishes more economically. Roger F. Waindle, Industrial Products Division, Elgin National Watch Co., Aurora, Ill.

Steel for Molds and Hobs for the Plastics Industry. Steels are far from simple either in composition or in their response to heat treatment. Because of this point, some steels are soft and plastic enough to be shaped into molds readily at room temperature in conventional presses; whereas other steels are hard and tough enough to serve as the hobs which form the impression in the steels used for molds. This paper is a concise presentation of the kinds of steel in use today; the reasons for the wide variety that exists; the basic principles that govern the heat treatment of steel; specific description of the steels used for molds and hobs in the plastic industry; and the heat treatments of these steels. Peter Payson, Crucible Steel Co. of America, New York, N. Y.

Selection and Maintenance of Hydraulic Presses. Despite the antiquity of the hydraulic press, tremendous improvements have been made to give the machine its many modern refinements and its present-day flexibility. Many of these improvements have come about under the impetus of demand for better machinery in metal forming and plastics molding. In plastics molding the most important factors in the use of the modern hydraulic press are its design, selection, and maintenance. An understanding of some of the principles of design is important to both the selection and the maintenance of machinery.

Commencing with definitions of the principal technical terms, the paper demonstrates the basic law of the hydraulic press and its extension to modern machinery used in plastics production. The application of these principles to the selection of machinery for specific production jobs is discussed, together with some important points in the care and maintenance of hydraulic machinery. A. J. DeMatteo, Watson-Stillman Co., Roselle, N. J.

Trouble-Shooting of Molding Problems. Molding problems, however unique and unusual they seem to be, usually arise from the interplay of four related factors: the plastic material, the part design, the mold design, and the molding conditions. If part design and mold design are correct (an assumption that cannot always safely be made), the problem is caused by variation in the material or in the molding conditions. The process of solving such a problem then becomes a deductive one, in which the various possible causes are cataloged and eliminated by careful testing until, if the trouble shooter is sufficiently persistent, analytical, and lucky, and the customer sufficiently patient, the true cause or causes are determined. In this paper the most frequently encountered molding problems and their symptoms are described, the possible causes listed, and the remedies indicated.

The difference between mere academic solutions and practical remedies which can

be applied in a commercial molding plant is pointed out. The work necessary to solve these problems may often have to be done under difficulties and the stress of production. The solution, when and if found, is usually not an elegant scientific one, but one which must be effective under production molding conditions. Frank J. Donohue, Monsanto, Springfield.

The Future of Plastic Films. This paper will review plastic films in packaging of industrial and consumer items, will indicate the size of various markets, and show trends to be expected as newer materials become available.

The various methods of production of film and of combining it with metal foil, paper, and cloth will be discussed. It will be shown that the choice of plastic film is frequently dictated by processing factors in making the package, and that the successful producer of film must keep in mind the problems of the converter. Milo Gerow and R. G. Kadesch, Reynolds Metals Co., Gary, Ind.

Polyethylene Permeability Data and Their Practical Use. Much costly and time-consuming testing of polyethylene for packaging applications can often be eliminated if sufficient attention is given to available permeability data.

This paper reviews the simple bag method for obtaining approximate permeability rates, theoretical considerations, method for predicting permeability rates from other known data, effect of temperature, and effect of liquid and gas phases. New data are presented on the permeability rates of various liquids through polyethylene, including several inorganic acids, organic materials, and various commercially marketed products. The permeation of hydrogen peroxide under both light and dark conditions and change of concentration of ammonium hydroxide are discussed. Other examples of practical applications of permeability data in packaging problems, including permeability analyses of the components of several liquid cosmetics, are given, along with a discussion of the general problem of evaluation of permeability data for mixtures. James H. Parliman, Plax Corp., Hartford, Conn.

Trends in Extrusion Equipment and Controls. In the extrusion section of the the plastics industry there has been less agreement than in the injection and compression section as to what constitutes desirable equipment. This paper will provide an up-to-the-minute review of designs of extruders and control equipment. Albert A. Kaufman, Industrial Synthetics Corp., Garwood, N. J.

Mold Steels for Plastics

Approximately 110 members and guests of the Newark Section attended the regular monthly dinner-meeting on December 8 at the Newark Athletic Club, Newark, N. J. Speaker of the evening was George Brumbach, Carpenter Steel Co., who discussed "Mold Steels for the Plastics Industry."

Mr. Brumbach began with a review of the history of mold steels since 1915, when Carpenter began to make molds for Liberty engine distributer head caps. The mold steels developed at that time remained popular until about seven years ago, when further developments were made, and consisted of five types: a Swedish iron possessing great hobbability; two water-hardening nickel-chrome steels possessing greater core strength; a high nickel-chrome oil-hardening steel having high core strength and little distortion, and used for large parts; and regular manganese tool steels used for high strength and greater accuracy of dimension. The speaker noted that all of these steels, with the exception of the Swedish iron, are still available and in use today.

Modern mold steel development work began about seven years ago with efforts to prevent the pitting and corrosion of molds during storage, resulting in the adaptation of Type 420 stainless steels to mold use. Recent developments include a hot-work steel of the nickel-chrome-molybdenum-vanadium type for molding high heat materials such as Mycalex; a high chrome steel which hobs well and has high core strength; and a chrome-molybdenum-vanadium steel which has the strength of high chrome-nickel steels plus heat and abrasion resistance and the ability to be hobbed. Mr. Brumbach concluded his talk by showing slides revealing how Carpenter sets out to develop mold steels having specific properties, and the method recommended by the company for avoiding strain during hobbing by allowing lateral flow.

In the business session preceding the talk, SPE President J. H. DuBois, Shaw Insulator Co., spoke briefly on the forthcoming National Technical Conference, outlining the program of speakers and urging attendance of all members. Section President James T. Growley, Celanese Corp. of America, announced that the Newark Section would play host to the New York Section at the next meeting, on January 12, at the Newark Athletic Club. Program Chairman Gilbert Peakes, Bakelite Corp., announced that this joint meeting will have as its subject, "Selecting the Right Plastic Materials," and that the speakers will be Robert Burns, Bell Telephone Laboratories, and Emil Beekman, Army Signal Corps Laboratory, Fort Monmouth.

Busby on Research

The New Orleans Section, SPE, met December 3 in the display room of Plastics Productions, Inc., with President H. A. Levey, American Products Mfg. Co., presiding. Speaker of the evening was H. A. Busby, Southern Regional Research Laboratories, United States Department of Agriculture, who discussed the "Research Potential for Plastics Manufacturing."

Mr. Busby said that the potential for greater expansion of the plastics industry is closely related to coordinated refinement of techniques of application together with development of special-use chemical constituents, such as plasticizers, solvents, extenders, and others. Consumption figures furnish indications of the market acceptable plastics and their relative prominence. An appraisal of the comparative values of plastics in use discloses the need of new testing techniques built around precise measurement of physico-chemical properties and rheological concepts. The greatest potential for further expansion of the plastics industry has risen from the development of silicones, new plasticizers, solvents, extenders, fillers, and resins having short molding times.

In the business session preceding the talk, the following new officers were elected: president, Leon Godchaux, II, Godchaux Sugars, Inc.; vice president, Ralph F. Chambers, Plastics Productions; secretary-treasurer, Frank Perschall; and national councillor, Mr. Levey. The new officers assume office at the next meeting of the Section on January 6. Mr. Busby, Sam Harris, and Mr. Levey were also elected members of the Section's board of directors. A discussion of the group's by-laws also took place, and it was voted to place them before the membership for further discussion at one of the regular meetings, preferably during the first quarter of 1949.

New Officers for Detroit Section

The annual business meeting of the Detroit Section occurred December 2 at Adrian Cotter's Tavern, Detroit, Mich. There were no speakers at the meeting, which was followed by a dinner. The following new officers were elected for 1949: president, Harry J. McGowan, Jr., Bakelite Corp.; vice president, John Mickey, Ford Motor Co.; secretary-treasurer, Carl Holmes, American Plastics Engineering Corp.; and directors, W. E. Biggers, Mr. Holmes, and E. Knauer.

Chicago Sections Hear Seely

Approximately 125 members and guests of the two societies attended a joint meeting of the Chicago Sections of SPE and SPI on December 8 at the Builder's Club. Featured speaker was Herman G. Seely, financial editor of the *Chicago Daily News*, whose topic was "In '49 Watch Washington."

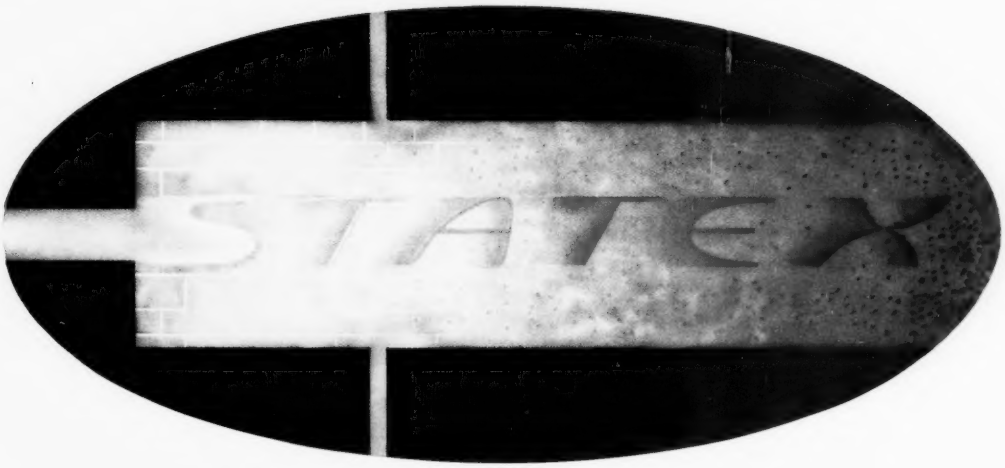
Mr. Seely used the title of his talk to emphasize that the best indication of what business conditions will be like in the immediate future can be obtained by seeing what the attitude of the new administration toward business will be. Another indication of expected business conditions can be obtained by watching automobile sales during the first quarter of 1949. This will give some clues as to whether the present mild recession which has been noticed in consumer goods industries, such as washing machines and vacuum cleaners, will continue to develop or remain very mild. According to the speaker, the current recession has been noticed mainly since the presidential election, but, of course, has been a long time in the making. Mr. Seely also discussed the effect of the phenomenal growth of the plastics industry on general business for the past 10 or 20 years and commented on the part that this industry may be expected to play in the future.

New officers of the Chicago Section, SPE, were announced at the group's annual business meeting preceding the talk. The new officers are: president, Clarence McCormick, Superior Plastics Division of Commonwealth Plastics, Inc.; vice president, Robert S. Stephen, Kurz-Kasch, Inc.; secretary-treasurer, Roscoe Amrine, Imperial Molded Products Co.; and new directors Jack Ashbaugh, Hydraulic Press Mfg. Co., Robert Webster, Sunlight Mfg. Co., and Mr. Amrine.

Plastics for Packages

Thirty-four members and guests of the New York Section, attended a regular dinner-meeting on December 14 at the Hotel Sheraton, New York, N. Y. Speaker of the evening was Carl Cobbledick, packaging director of Egmont Arens Associates, who discussed "Plastics in Packaging."

Plastics will become more widely accepted as a packaging material, Mr. Cobbledick said. Manufacturers' resistance to plastic packages has been based on their higher unit cost, but such resistance is not justified in view of the greater sales appeal of the plastic package. Although higher unit costs prohibit use of plastics for every packaging application, the following factors justify consideration of plastics for any specific packaging problem: (1) possibility of increasing sales by converting a planned purchase item into an impulse pur-



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chase item; (2) building demand and brand loyalty by plastic containers having re-use value; (3) merchandising the line with matched-set containers which stimulate the purchaser to buy the whole line in order to complete the set; and (4) prestige and novelty of plastic packages where such qualities help sales. Mr. Cobbledick illustrated his talk with samples of plastic packages used to merchandise different types of products, giving case histories of increased sales following introduction of the plastic package. The speaker concluded by emphasizing that the plastic package is primarily a merchandising aid and only secondarily a container.

In the business session preceding the talk, Section President Arthur Nufer, Bakelite Corp., announced the election of the following new directors: George Barron, Ideal Plastics Corp.; E. V. Walsh, Tech-Art Plastics Co.; and Bruno Wessinger, Wess Plastic Molds, Inc. Mr. Nufer announced that the group will be the guests of the Newark Section at its next meeting, January 12, at the Newark Athletic Club.

Thayer Addresses South Texas Section

The South Texas Section, SPE, held a regular dinner-meeting November 17 at Felix's Mexican Restaurant, Houston. Approximately 30 members and guests heard Gordon B. Thayer, Dow Chemical Co., speak on "Injection Molding Design for Polystyrene." Mr. Thayer gave an interesting and informative talk on the design factors involved in polystyrene injection, and his talk was followed by a lively discussion period.

The South Texas Section held its annual business meeting December 15 at the Ben Milam Hotel, Houston, and elected the following officers for 1949: president, Marion A. Arthur, Humble Oil & Refining Co.; vice president, C. G. Harrison, Public Works Department, City of Houston; and secretary-treasurer, Willis L. Barnes, H. L. Thompson Co. The following directors were also elected in addition to the above officers: H. S. Henderson and L. D. Harvey, both of Dow Chemical Co.; J. A. Sinclair, McArdle Equipment Co.; Phil Shay, Reed Roller Bit Co.; D. E. Henderson, F. H. Maloney Co.; and D. E. Bloxsom, Southwestern Plastics, Inc. Mr. Bloxsom was reelected to the SPE National Council and to the National Advisory Board, and D. E. Henderson was also elected to the advisory board.

The Section was chartered in January, 1948, with 15 members, and now has 25 members at the end of the first year. Meetings are held the third Wednesday of each month, except during the summer, and are open to all interested parties. Section committee members for 1949 follow: program—D. E. Henderson, chairman, Mr. Bloxsom, and V. C. Henrich; house-publicity—Mr. Barnes, chairman, N. McFadyen, and H. L. Collins; membership-credentials—Mr. Harrison, chairman, Mr. Sinclair, and B. W. Wallin; and election-nominating—H. S. Henderson, chairman, Perry Warmath, and Mr. Harvey.

Vail Discusses Molding

The Philadelphia Section, SPE, held a regular dinner-meeting November 16 at the Franklin Institute, Philadelphia, Pa., with approximately 50 members and guests attending. Featured speaker was E. W. Vail, Bakelite Corp., who discussed "Practical Application of the Theoretical Aspects of the Closed Mold Method of Molding Thermosetting Materials." Mr. Vail's talk was identical with the paper by C. A. Norris, of Bakelite, which appeared in our July issue. Entertainment was provided by an auction of plastics products contributed by the members.

Three Speakers before Western New England Section

Approximately 80 members and guests of the Western New England Section attended a dinner-meeting on December 1 at the Hotel Sheraton, Springfield, Mass. George Carlson, Arrow-Hart & Hegeman, introduced the three speakers: Jerry Heldrich, factory superintendent of Plax Corp., who discussed "Finishing of Sheets and Rods"; Sherwood Young, vice president and general manager of C. F. Church Mfg. Co., who spoke on the "Finishing of Injection Molded Parts"; and Frank Scanlon, finishing superintendent of Arrow-Hart, who discussed "Finishing of Phenolics."

Mr. Heldrich began with a detailed description of the methods used by Plax to machine polystyrene, emphasizing the need of sharp tools, rapid removal of chips, cooling of the plastic surface, and annealing of the plastic both before and after machining. Mr. Heldrich also discussed methods of punching and blanking polystyrene sheets, and means of buffing and tumbling various thermoplastics.

Mr. Young gave an enlightening talk on the finishing of injection molded parts by his company and illustrated several types of polishing compounds. Mr. Scanlon's talk consisted of a demonstration of different types of finishing fixtures and samples of finished products, with descriptions of the finishing techniques employed.

In the business session preceding the talks, Secretary Ed Vaille, Bakelite Corp., reported that the Section's membership now totals 75, an increase of 33 for the year, and Treasurer Jack Bitter, Parker Stamp Works Co., reported on the Section's financial status. The new officers and directors of the Section for 1949, as elected by the directors, were introduced, as follows: president, Mr. Young; vice president, George Whitehead, Improved Paper Machinery Corp.; secretary, Mr. Vaille; treasurer, J. Brown, Pro-Phy-Lac-Tic Brush Co.; and directors, Robert Crawford, Monsanto Chemical Co., W. Noble, Morart Gravure Corp., M. J. Petretti, Noma Electric Corp., F. J. Donahue, also of Monsanto, and Mr. Bitter. The following committee chairmen were also announced: membership, Mr. Donohue; credentials, H. H. Hasenzahl; program, Mr. Petretti; publicity, Mr. Noble; and house, Mr. Crawford.

New Vinylum Pastes

A NEW Vinylum development, consisting of blending ground and polished aluminum powder with a primary ester-type plasticizer to form an easily workable paste, has been announced by Argus Chemical Laboratory, Inc., 56 Clifton Pl., Brooklyn 5, N. Y. The paste is available in two types, Vinylums P-50 and P-60, both of which contain 50% aluminum, with the balance consisting of plasticizer and dispersing agent. The P-50 contains a fine particle-size aluminum; whereas the P-60 grade contains an ultra-fine-size aluminum.

The new products have the following advantages claimed over conventional pastes being marketed currently: (1) minimum stearic acid content insures against surface dulling, allows subsequent printing to adhere tenaciously to the vinyl film, and results in brighter metallic iridescence; (2) elimination of solvent gives a paste that is 100% "solids," gives uniform concentration because there is no solvent loss, has no solvent residue to cause poor aging qualities, and presents no health or fire hazard because of a volatile solvent; (3) the plasticizer is completely compatible with the vinyl resin and thus facilitates quick and uniform dispersion of the aluminum powder into the vinyl film; and (4) the pastes are clean and convenient to handle.

New Plastic Coating

THE development of Good-rite vinyl resin latex, a plastic coating which offers the horticultural field and fresh food packaging industry a new technique in preserving and packaging, has been announced by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O. Use of the new material, it is claimed, will minimize spoilage and wilt which annually has resulted in thousands of dollars of damage to fruit, vegetables and many other edible and decorative products.

The new product is a colloidal dispersion of vinyl resin in water which dries quickly at ordinary room temperature to form a transparent, ordorless film less than 0.001-inch thick. It may be applied with a spreader, roller, or brush; sprayed on with either a hand or mechanical sprayer; or used as a dip. Applications foreseen for the latex include use as a preservative coating for Christmas decorations to prevent needle drop and keep the tree, wreath, or holly fresh and green; as a supplement in insecticidal and fungicidal mixtures to prolong their life and increase their effectiveness; as a protective coating for trees, bulbs, roses, and perennials to prevent dehydration during transplanting, shipping, and display; and as a supplement with 2,4-D to make use of this material safer.

Correction

AN ERROR appeared in the description of Stabilizer L, a new product of Advance Solvents & Chemical Corp., published on page 357 of our December issue. The sentence, "It is completely water *soluble* and therefore does not increase the water sensitivity of vinyl films ...." should read, "It is completely water *insoluble* ...."

Symposium on Calendering

A SYMPOSIUM on "Calendering of Rubber" will be held the afternoon of February 4 at the meeting of the Chicago Rubber Group at the Morrison Hotel, Chicago, Ill. Two papers will be presented: "New Equipment for Precision Calendering," by G. V. Kulloren, Adamson United Co.; and "Instrumentation in the Rubber Industry as Applied to Fine Calendering," by N. R. Stilwell, Foxboro Co. The evening session will comprise dinner, a discussion of future Group activities, and showing a motion picture.

Scientific and Technical Activities

Rubber and Plastics Division, A.S.M.E., New York Meeting

THE Rubber and Plastics Division of the American Society of Mechanical Engineers held two technical sessions as part of the annual meeting of the parent Society in New York during the week of November 28. The first session of the Rubber and Plastics Division on the morning of November 30 had, as chairman, L. A. Wood, Rubber Section, National Bureau of Standards, and, as recorder, W. N. Keen, E. I. du Pont de Nemours & Co., Inc. The second session on the afternoon of the same day had, as chairman, David Scott, Jr., Scott Testers, Inc., and, as recorder, E. N. Cunningham, Enjay Co. J. F. Downie Smith, Iowa State College, chairman of the Division, opened both sessions and introduced the chairmen and recorders for each session to an attendance of between 75 and 100 members and guests.

A meeting of the executive and general committees of the Division was held the evening of November 30, at which time new officers for the coming year were installed, and other business, including the selection of members for the various committees necessary to carry on the work of the organization, was conducted. The chairman of the Division for the year 1949 is D. H. Cornell of the B. F. Goodrich research center, and the secretary is F. W. Warner of General Electric Co.

The new chairman was graduated from the University of Akron in 1939 with a bachelor's degree in mechanical engineering and was employed in the physical research laboratory of The B. F. Goodrich Co. from 1939 to August, 1946. From that date until March, 1948, Mr. Cornell coordinated information in connection with the construction of the new research center of the Goodrich company. Since March, 1948, he has been manager, engineering services, B. F. Goodrich Research Center, Brecksville, O.

The new secretary was graduated from Pennsylvania State College with a bachelor's degree in chemical engineering in 1929 and has been associated with General Electric since that time. Mr. Warner has been associated with the plastics division of General Electric since 1931 as product engineer, works engineer, etc. and is now engineering manager of the division.

The Technical Sessions

The morning session on November 30 heard first a paper entitled "Soft Rubber Bearings—Design Features and Methods of Application to Conditions of Water Lubrication" by A. Bednar, Lucian Q. Moffitt, Inc. "Soft rubber and rubber-like synthetic compositions have been used as materials for water lubricated bearings for more than 25 years, and they have shown important operating efficiencies and economies in pumping equipment, on marine propeller shafts, dredge cuttershafts and similar applications, even when severe abrasive conditions exist, this speaker stated. The elasticity of the bearing material, and bearing design, provide good friction characteristics, sound and vibration deadening properties, and abrasion resistance. Present synthetic materials are oil and heat resistant. Best performance is obtained when good quality non-corrodible shafts and shaft sleeves are present. In extremely abrasive or muddy water special provisions for water circulation improve performance, Mr. Bednar added.

The discussion which followed the presentation of this paper was concerned with the problems of lubrication and amount of friction met with and the associated subjects of bearing pressure and clearance.

The next paper, "Report on Friction Tests of Flow Controlled Continuous Film Lubricated Rubber Bearings," was given by J. W. Stanley, of E. J. Willis Co. Mr. Stanley first described the specially designed Willis rotary rubber bearing and then reported on tests for dynamic friction, starting friction, and accelerated wear. The dynamic friction tests showed that at low speeds the friction torque was comparatively low and that with increased shaft speed the friction torque decreased. The tests for starting friction showed that starting friction at all loads was not so high as had previously been experienced in submerged rubber bearings. Power consumption over the entire range from starting to high speeds was comparatively low, it was said. The accelerated wear test showed that the bronze component wore approximately five times as much as the rubber component. The advantages of the Willis bearing, which permits the replacement of the worn rubber bearing without replacing or repairing the shaft, was also stressed.

Blank & Stoller

D. H. Cornell

F. W. Warner

During the discussion period L. L. Smith, of Continental Rubber Works, which has collaborated with the Willis company in the manufacture of these rubber bearings, mentioned that clearance tolerances were less critical than with metal bearings. A rubber stock of 70 to 82 durometer hardness was used in the manufacture of the Willis bearing, it was stated.

"Nylon as a Bearing Material" was the subject of the third and last paper of the morning session. This paper was presented by R. B. Akin, du Pont, instead of by D. B. Hanson, of the company, as originally scheduled. The good quality of nylon as a bearing material is one of the factors responsible for its use in a variety of industrial applications, Mr. Akin declared. In some cases it has given better service than other metal and plastic materials. The low cost of nylon bearings is a result of its ability to be injection molded to the desired size.

Data were provided to indicate the conditions under which nylon will serve as a bearing. The ability of nylon to operate without lubrication under mild conditions was noted from early applications, and it has since been shown that both water and oil lubrication are effective in extending the load and speed capacity of nylon bearings. Nylon has a low coefficient of friction; clearance tolerances are less critical than for metals, and abrasion resistance is outstanding.

During the discussion period it was stated that the information in this paper was to be considered as a preliminary report and that the du Pont company had recently started a project at Battelle Memorial institute to determine the limits of nylon as a bearing material.

The second technical session began with a paper on "Frictional Characteristics of O-Rings with a Typical Hydraulic Fluid," by L. E. Cheyney, W. J. Mueller, and R. E. Duval, Battelle Institute. It was explained that rubber O-ring packings employed in aircraft hydraulic systems are subject to numerous operating variables which affect the friction involved in their operation. An apparatus designed for studying the effect on friction of some of the important operating variables was described. The results of tests to determine the effect of hydraulic pressure, time delay between strokes, squeeze of the O-ring packing, stroke speed, O-ring size, and surface finish of the moving metal part were presented and discussed.

Written and oral comment on this paper paid tribute to the value of the information both to manufacturers of O-rings and to the major users, the Armed Services, and also included many suggestions for future work along the lines of improved rubber compounds, analyses of the metal rod material used, and possible improvement in the means of measuring the friction produced.

"Laboratory Testing of Rubber Bearings" was the title of the next paper, given by J. R. Beatty and D. H. Cornell of the Goodrich research center. Rubber bearings, generally lubricated with water, have many advantages over other types of water lubricated bearings with respect to wear, friction, and noise. Tests have been developed to measure the important properties with reasonable speed and accuracy on laboratory and full-scale equipment, it was stated. Apparatus and methods were described, and the paper provided considerable information on the calculation of bearing pressures. Bearing materials tested for wear include natural and synthetic rubbers, lignum vitae, phenolic bonded and impregnated laminates, nylon, and other synthetic resins.

Research programs planned to utilize the results of the tests made have provided greatly improved bearings. Wear and coefficient of friction have been lowered, and premature failure and noise found in unusual cases have been effectively eliminated by changes in construction or composition of the bearings.

The annual review paper on rubber was prepared by Lois W. Brock, G. H. Swart, and E. V. Osberg, General Tire & Rubber Co., and was one of the most comprehensive papers of this type ever presented before the Rubber and Plastics Division. It was entitled "Advances in Rubber 1947-1948" and covered the period October, 1947, through June, 1948. This article appears on page 464.

The annual review paper on plastics by E. L. Kropscott, of Dow Chemical Co., first emphasized that 10 years ago the production of plastics in the United States totaled 40 million pounds and in 1948 production had risen to one billion pounds or about eight pounds per person. The trend today in plastics is more pieces and larger pieces at lower cost, it was said. The cooperation of the material supplier, the machinery manufacturer, and the plastics fabricator are required to achieve the manufacture of more parts in less time.

The development of injection molding machines of 40- and 48-ounce capacity and techniques for molding large-area pieces were cited in the machinery field, and plastic bearings and gears requiring no lubrication, the use of plastics for containers for rigid packaging, disposable plastic bottles, and wash basins formed from acrylic sheet, in the application field, were some of the many advances mentioned for the year 1948.

The new high-temperature polymer of trifluorochloroethylene and a new line of silicone molding powders were listed among the new plastics, and new grades of polystyrene with improved light and heat resistance were mentioned along with the development of resin-rubber combinations in the field of improvements to existing plastics.

It was emphasized that since plastics were relatively new materials, their performance history was generally limited to a few months or a few years, and that considerable caution should be exercised in steering a course between the two views of "use plastics for nothing and use plastics for everything" when plastics applications are discussed with new or old users.

Executive and General Committee Meetings

As mentioned previously, the new chairman of the Division for 1949 is D. H. Cornell, and the new secretary, F. W. Warner. Other members of the five-man executive committee in addition to these officers are Mr. Keen; G. W. Neely, Richardson Co.; and M. E. Lerner, *Rubber Age*, the only new member of the board elected at this meeting.

Several new members were nominated for the general committee, but pending acceptance by these new members, the make-up of this committee will be withheld and published at a later date.

J. F. Downie Smith, the retiring chairman of the Division, becomes a member of the advisory committee, which is made up of the past chairmen for the last five years.

J. Delmonte, Plastics Industry Technical Institute, was elected research secretary for 1949, and Mr. Lerner is publicity chairman.

Gordon Kline, National Bureau of Standards, is chairman of the plastics papers committee, and other members of this committee are W. N. Findley, University of Illinois; James Bailey, Plax Corp.; N. K. Nason, Monsanto Chemical Co., and W. F. Bartoe, Rohm & Haas Co.

The chairman of the rubber papers committee is R. G. Seaman, INDIA RUBBER WORLD, assisted by E. N. Cunningham, Enjay Co., and R. K. Williams, General Motors Corp.

It was decided that the Division would not schedule any technical sessions for the ASME meeting in New London, Conn., in the early part of 1949; it might participate in the meeting in San Francisco, Calif., in June if Mr. Delmonte can arrange for papers on the West Coast. It was further decided that the Division would hold two sessions at the meeting in Erie, Pa., in September and two sessions at the 1949 annual meeting in New York.

New Editorial Advisory Board Members for India RUBBER WORLD

WHEN the India RUBBER WORLD Editorial Advisory Board was formed in September, 1946, it was indicated that it would be both necessary and desirable to replace various members of the Board from time to time. For the year 1949 three new members will replace three former members who retired at the end of 1948. John H. DuBois, Shaw Insulator Co., replaces Sam L. Brous, B. F. Goodrich Chemical Co., in the plastics field; while Bernard H. Capen, Tyer Rubber Co., takes the place vacated by C. E. Reynolds, Odell Co., in the footwear and general sundries branch of the rubber industry; and P. D. Brass, United States Rubber Co., succeeds S. I. Strickhouser, of that company, in the field of latex and latex technology.

Philip D. Brass

Bernard H. Capen

Some information regarding the education and background of these new Editorial Advisory Board members together with recent photographs of each member follow:

Philip D. Brass, United States Rubber Co., Passaic, N. J. Dr. Brass received his bachelor's degree in chemistry from Yale University in 1928 and his doctor's degree from California Institute of Technology in 1932. He has been in the employ of U. S. Rubber since 1933 as a research chemist specializing in latex and latex processes for the manufacture of thread, dipped and spread goods, wire, foam sponge, and tires. He was co-author with W. A. Gibbons of the chapter on "Properties of Latex" in the "Chemistry and Technology of Rubber" by Davis and Blake, published in 1937. Dr. Brass has been at the central research laboratories of U. S. Rubber, where he is now located, for somewhat less than half of his period of service with that company. From 1937 until 1947 he was stationed at the Providence, R. I., plant of U. S. Rubber. He will advise and assist the editor of India RUBBER WORLD in the field of latex and latex technology.

Bernard H. Capen, Tyer Rubber Co., Andover, Mass. After receiving a chemical engineering degree from Northeastern University in 1920, Mr. Capen was chemist for Plymouth Rubber Co. (1920-1922), Armstrong Cork Co. (1922-1923), and Bloomingdale Rubber Co. (1923-1924); chief chemist for Taunton Rubber Co. (1924-1926); superintendent and technical manager of Clifton Mfg. Co. (1926-1932); and technical superintendent of Steadfast Rubber Co. (1932-1937); then he joined Tyer in 1937 in his present capacity of chief chemist. Mr. Capen served during the war as a member of the Flotation Equipment Technical Committee and the GR-S Rubber Footwear Committee. He is 1949 chairman of the Boston Rubber Group and is active in the Group's affairs. Mr. Capen will act as adviser to India

RUBBER WORLD in the fields of rubber footwear and general sundries.

John H. DuBois, Shaw Insulator Co., Irvington, N. J. After receiving his B.S. degree from the University of Minnesota in 1927, Mr. DuBois was with the plastics department of General Electric Co. from 1928 to 1944, at which time he joined Shaw Insulator in his present capacity as executive engineer. The author of several books on plastics, Mr. DuBois was national president of the Society of Plastics Engineers, Inc., in 1948, and national vice president in 1947. He is also a member of the Society of the Plastics Industry, A.S.T.M., and HKN, the honorary electrical engineering fraternity. An acknowledged authority on plastics, Mr. DuBois will advise India RUBBER WORLD in this field and assist in the further development of our Department of Plastics Technology.

Harris & Ewing

John H. DuBois

Elect Officers at Parties

THE finest Christmas Party in the history of The Los Angeles Rubber Group, Inc., took place December 9 at the Los Angeles Breakfast Club, Los Angeles, Calif. Approximately 275 members and guests attended the affair, which began with a cocktail hour and dinner, with dancing during the meal and thereafter until 1:00 a.m. to the music of Herb Adkins and his orchestra.

Sociability was the keystone of the evening, and much appreciation was expressed to the committee in charge of arrangements which consisted of Chairman E. C. McLaughlin, H. M. Royal, Inc., assisted by George R. Steinbach, Atlas Sponge Rubber Co., and Tway W. Andrews, also of Royal. Table favors, comprising a bottle of perfume for each lady, were furnished by the prize committee, comprising J. Ray Morath, Naugatuck Chemical Division of United States Rubber Co., L. E. Budnick, Ohio Rubber Co., and Bernard Del Guerra, L. A. Standard Rubber Co. Drawings for door prizes for the ladies were also handled by this committee.

During a short intermission, Phil Drew, Goodyear Tire & Rubber Co., handed over the gavel to the incoming chairman, Charles H. Churchill, Sterling Rubber Products Co., after reviewing the outstanding events of the past year. Mr. Drew also noted that the Group now has a membership of 325, the largest in its history. The other new officers and directors of the Group were then presented, as follows: associate chairman, Mr. McLaughlin; vice chairman, R. D. Abbott, consultant; secretary, A. J. Hawkins, Jr., E. I. du Pont de Nemours & Co., Inc.; treasurer, Mr. Budnick; and directors, Mr. Drew, R. L. Short, Kirkhill Rubber Co., Carl S. Hoglund, Goodyear, and D. C. Maddy, Harwick Standard Chemical Co.

New York Rubber Group

THE annual Christmas Party of the New York Rubber Group was held December 10 at the Henry Hudson Hotel, New York, N. Y., with approximately 490 members and guests attending. The party began with a cocktail hour at 5:30 p.m., followed by dinner at 6:30. Then came a short business session and election of officers, after which entertainment in the form of seven acts of vaudeville was presented. Audience participation, both solicited and unsolicited, in this part of the program was very active and indicated the degree of interest aroused by the performances. The evening concluded with a drawing for some 110 valuable prizes made possible by the contributions and donations of many rubber and supplier companies and individuals.

The nominating committee under the chairmanship of Simon Collier, Johns-Manville Corp., assisted by Harry Outcault, St. Joseph Lead Co., and George Wyrough, Whitehead Bros. Rubber Co., announced the following slate of candidates, who were then unanimously elected: chairman, Peter P. Murawski, E. I. du Pont de Nemours Co., Inc.; vice chairman, D. E. Jones, American Hard Rubber Co.; secretary-treasurer, B. Brittain Wilson, India RUBBER WORLD; sergeant-at-arms, Emil W. Schwartz, Moore & Munger; and directors for three-year terms, T. A. Bullifant, Barrett Division, Allied Chemical & Dye Corp., George N. Vacca, Bell Telephone Laboratories, J. J. DeMunnick, American Tile & Rubber Co., and E. N. Cunningham, Enjay Co. Retiring chairman J. E. Waters, General Cable Corp., and retiring secretary-treasurer Peter P. Pinto, *Rubber Age*, become *ex-officio* members of the executive committee.

Detroit Group

THE Detroit Rubber & Plastics Group, Inc., held its annual Christmas Party and election of officers on December 10 at the Detroit-Leland Hotel, Detroit, Mich. An attendance of 250 members acclaimed the party as one of the largest and best in the Group's history, and retiring Chairman C. W. Selheimer, Illinois Institute of Technology, held the party to be a fitting climax to a very successful year. The program consisted of a cocktail hour and dinner, followed by vaudeville entertainment and group singing, and the distribution of 40 door prizes donated by some 60 companies in the rubber and allied fields.

New officers elected by the Group are: chairman, W. B. Davies, Kaiser-Frazer Corp.; vice chairman, G. M. Wolf, Sharples Chemicals, Inc.; secretary, J. C. Dudley, Chrysler Corp.; treasurer, E. J. Kvet, Baldwin Rubber Co.; and counselor, J. P. Wilson, Ford Motor Co. Other members of the executive committee are: T. W. Halloran, Chemical Products, Inc. (membership); G. T. Lindner, Minnesota Mining & Mfg. Co. (program); G. R. Cuthbertson, United States Rubber Co. (publicity); R. J. Shroyer, R. T. Vanderbilt Co., Inc. (counselor); G. P. Hollingsworth, Minnesota Mining; and P. Smith, General Tire & Rubber Co.

Buffalo Group

THE annual Christmas Party of the Buffalo Rubber Group took place on December 14 at the Hotel Westbrook, Buffalo, N. Y., with 129 members attending. The party included a cocktail hour, dinner, floor show, and distribution of prizes. Paul Gamble, Xylos Rubber Co., was the after-dinner speaker. The prizes, so numerous that everyone received one, and the entertainment were made possible by the contributions of some 84 rubber and supplier companies.

In the brief business session following dinner, the membership voted to adopt a revised constitution and elected the following new officers and directors for 1949: chairman, Wayne Nelson, American Container Corp.; vice chairman, John Augenstein, U. S. Rubber Reclaiming Co.; secretary-treasurer, Paul Sick; and executive committee, Paul Tufts, Walter Lex, Burt Wetherbee, of Wetherbee Chemical Co., Robert Thome, E. C. Siverson, of Buffalo Weaving & Belting Co., and Wilber Parsons.

Northern California Group

THE Northern California Rubber Group held its party December 13 at Club Alsam, Lafayette, Calif. Ninety-two members and their wives attended, and it was agreed that this party also was the most successful one in the Group's history. In addition to dinner and an evening of dancing there were entertainment and the distribution of prizes to each woman present and to the outgoing officers.

The results of the recent election of officers for 1949 were announced at a brief business session, as follows: president Don Good, American Rubber Mfg. Co.; vice president, Robert J. Henderson, American Rubber; secretary, Robert R. James, Mare Island Naval Shipyard; treasurer, Neil McIntyre, Oliver Tire & Rubber Co.; and directors, George B. Farwell and George I. Petelin, both of Goodyear Rubber Co., John A. Liljegren, Pioneer Rubber Mills and outgoing President Ross E. Morris, also of Mare Island.

Boston Group

THE Boston Rubber Group held its highly successful Christmas Party on December 17 at the Somerset Hotel, Boston, Mass. Approximately 422 members enjoyed the program, which consisted of a cocktail hour, dinner, business session, floor show, and the distribution of many door prizes.

The election of Group officers for 1949 took place during the business session, with the following results: chairman, Bernard H. Capen, Tyer Rubber Co.; vice chairman, Harry W. Sutton, Boston Woven Hose & Rubber Co.; secretary-treasurer, Thomas C. Edwards, Enjay Co.; and additions to the executive committee, John Andrews, Godfrey L. Cabot, Inc., and Edward D. Covell, Stedfast Rubber Co. It was also reported that the Group now has a total membership of 659.

Hold Yuletide Fetes

THE annual Christmas Party of the Southern Ohio Rubber Group was held December 10 at the Miami Valley Golf Club, Dayton. Approximately 184

members and their wives enjoyed an evening of cocktails, dinner, and dancing. Howard Rucker, Dayton Rubber Co., was general chairman of the meeting and was assisted by a committee consisting of G. E. Lang, Premier Rubber Co., R. B. Sucher, Inland Mfg. Division of General Motors Corp., V. K. Hitch, Akron Chemical Co., Roy Marston, Binney & Smith Co., Ralph Appleby, E. I. du Pont de Nemours & Co., Inc., and Andrew Wightman, also of Dayton Rubber. Gifts to the ladies were distributed by Santa Claus, who also conducted the drawing of 39 door prizes made possible by the contributions of many rubber and supplier companies.

Chicago Rubber Group

One of the most successful Christmas parties in the history of the Chicago Rubber Group took place December 17 at the Morrison Hotel, Chicago, Ill. More than 750 members and their wives and guests enjoyed the program consisting of a cocktail hour, an eight-course dinner, a two-hour floor show of outstanding nightclub acts, and an evening of dancing. The ladies were presented with costume jewelry favors with the compliments of the Group and also took part in the drawing for 15 door prizes.

The committee in charge of arrangements for the affair consisted of Ralph F. Anschuetz, Witco Chemical Co., chairman; H. A. Winkelmann, Dryden Rubber Division of Sheller Mfg. Corp.; Charles E. Wonder, Van Cleef Bros., Inc.; Vincent La Brecque, Victor Mfg. & Gasket Co.; and Joseph Zak, R. Cary Co. The officers and committee members expressed their appreciation for the contributions of more than 120 rubber and supplier companies.

Connecticut Group Elects

RESULTS of the recent mail balloting for 1949 officers and directors have been announced by the Connecticut Rubber Group. The new officers and directors elected are: chairman, Stuart M. Boyd, Naugatuck footwear division, United States Rubber Co.; vice chairman, Donald Spengler, Sponge Rubber Products Co.; treasurer, George Sprague, Sponge Rubber; secretary, Carl A. Larson, Whitney Blake Co.; and directors: H. V. Allison, Allison Co., E. J. Butler, General Electric Co., and G. T. Vaala and A. J. Jennings, both of E. I. du Pont de Nemours & Co., Inc.

Watson on Synthetic Latices

THE Ontario Rubber Group, C.I.C., was the guest of the Wellington-Waterloo Section, C.I.C., at a dinner-meeting on December 8 at Walper House, Kitchener, Ont., Canada. Some 83 members and guests of the two groups heard W. H. Watson, Polymer Corp., speak on "Synthetic Latices, Their Production and Use."

Mr. Watson first reviewed the general fundamentals involved in the manufacture of GR-S latex and the functions of the various ingredients used therein. He then discussed the physical properties of synthetic latices, as compared with natural latex, and described the function and use of the different emulsifiers. The main portion of the talk was devoted to the many industrial uses of both natural and synthetic latex in such processes as dipping, casting, impregnating, foam sponge, rug backing, etc. Mr. Watson stated that GR-S latex has poor wet strength and is not satisfactory for use in foam sponge, the large single application for latex, but shows to best advantage in forms where it is supported by such materials as paper and fabrics. An interesting use for GR-S latex is in blends with Portland cement to give flexible, crackproof, low-weight cement which is finding much use in ocean-going vessels. The new low-temperature GR-S latex shows excellent promise, having tensile strengths up to 3,000 p.s.i. The future of latex is bright, Mr. Watson declared, and in many instances it is replacing the dry rubber process.

CALENDAR

Jan. 25.	Washington Rubber Group.
Jan. 26.	South Texas Section, SPE. Ben Milam Hotel, Houston, Tex.
Jan. 27-29.	Division of High Polymer Physics, APS. Columbia University, New York, N. Y.
Jan. 28.	Buffalo Section, SPE. Westbrook Hotel, Buffalo, N. Y.
Jan. 29-Feb. 4.	National Sporting Goods Association. Annual Convention and Show. Ambassador Hotel, Atlantic City, N. J.
Feb. 1.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Feb. 1.	Chicago Section, SPE. Merchants & Manufacturers Club, Chicago, Ill.
Feb. 2.	Western New England Section, SPE. Hotel Sheraton, Springfield, Mass.
Feb. 4.	Chicago Rubber Group. Symposium on Calendering. Hotel Morrison, Chicago, Ill.
Feb. 8.	New York Section, SPE. Hotel Sheraton, New York, N. Y.
Feb. 9.	Newark Section, SPE. Newark AC, Newark, N. J.
Feb. 9.	Rhode Island & Southeast Massachusetts Section, SPE. Providence Engineering Societies Bldg., Providence, R. I.
Feb. 10.	Chemical Markets Research Assn. and Polytechnic Institute of Brooklyn, Joint Meeting. Hotel Biltmore, New York, N. Y.
Feb. 15-16.	Society of the Plastics Industry of Canada. Seventh Annual Conference. Niagara Falls, Ont., Canada.
Feb. 16.	South Texas Section, SPE. Houston, Tex.
Feb. 18.	Akron Rubber Group. Symposium on Industrial Fabrics. Mayflower Hotel, Akron, O.
Feb. 19-27.	National Sportsmen's Show. Grand Central Palace, New York.
Feb. 21-23.	National Sporting Goods Association of Canada. Annual Meeting. General Brock Hotel, Niagara Falls, Ont., Canada.
Feb. 25.	Buffalo Section, SPE. Westbrook Hotel, Buffalo, N. Y.
Feb. 28-Mar. 4.	ASTM. Spring Meeting and Committee Week. Hotel Edgewater Beach, Chicago, Ill.
Mar. 1.	Chicago Section, SPE. Merchants & Manufacturers Club, Chicago, Ill.
Mar. 1.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Mar. 2.	Western New England Section, SPE. Hotel Sheraton, Springfield, Mass.
Mar. 8.	New York Section, SPE. Hotel Sheraton, New York, N. Y.
Mar. 9.	Newark Section, SPE. Newark Athletic Club, Newark, N. J.
Mar. 9.	Rhode Island & Southeast Massachusetts Section, SPE. Providence Engineering Societies Bldg., Providence, R. I.
Mar. 16.	South Texas Section, SPE. Houston, Tex.
Mar. 22.	Washington Rubber Group.
Mar. 25.	Chicago Rubber Group. Hotel Morrison, Chicago, Ill.
Mar. 25.	Boston Rubber Group, Somerset Hotel, Boston, Mass.
Mar. 25.	Buffalo Section, SPE.
Mar. 27-Apr. 1.	American Chemical Society. National Meeting. San Francisco, Calif.

Dielectric Heating Discussed

A TALK on "Dielectric Heating in the Rubber Industry," by E. S. Mielke, Westinghouse Electric Corp., was the feature of the November 18 dinner-meeting of the Rhode Island Rubber Club at the Crown Hotel, Providence. Approximately 100 members and guests heard this talk, which preceded a showing of the Westinghouse film, "Radio Frequency Heating."

In the rubber industry, radio frequency heating is excellent for preheating bulky objects prior to molding, but its use in finishing the curing job must await the development of molds made from ceramics, silica, or similar non-conductive materials, Mr. Mielke said. Dielectric heating is satisfactory for low-pressure plastic resin molding, such as in the impregnation of glass fiber or the cementing of plywood. Dielectric heating, however, is not applicable as yet to the heating of thin sheets because of current inability to develop ultra-high-frequency micro-waves or tubes capable of supplying high power output for lengthy continuous periods.

Radio frequency heating is not cheap, the speaker emphasized, but sometimes is the only solution to a specific problem. Notable applications have been in the molding of foam latex mattresses, chair cushions, etc., where uniform heating is essential. Dielectric curing of solid rubber tires without obtaining a soft, uncured center area has been accomplished with a reduction in overall curing time of about 50%. Similarly, dielectric heating reduced curing time for sponge rubber arm rests from 40 to 12 minutes, while simultaneously eliminating the overcure of certain protruberances on a specific design. Mr. Mielke concluded by stating that the future of dielectric heating lies with the rubber manufacturers. Nearly all progress in this field has been made recently by working directly with the manufacturers and has resulted in many interesting new applications which have not as yet been made public.

Election of new officers of the group for the coming year took place during the business session. New officers elected are: chairman, Harry A. Schlosser, Berlow & Schlosser Co.; vice chairman, Frederick S. Bartlett, United States Rubber Co.; secretary-treasurer, Fred V. Newman, Respro, Inc.; and directors, Francis W. Burger, Kleistone Rubber Co., Inc., W. Kenneth Priestly, U. S. Rubber, and A. Donald Cummings, Collyer Insulated Wire Co., Inc. Other directors of the group include R. G. Volkman, U. S. Rubber, C. Leigh Kingsford, Davol Rubber Co., and William Potterton, Ernest Jacoby & Co.

RUBBER WORLD
NEWS of the MONTH

High-Level Activity for 1949 Forecast; Government Sells Neoprene Plant

With business activity in the United States expected to continue at a high level during 1949, the rubber industry is looking forward to another year of production and sales about equal to that of the last three postwar years, which have established all-time records. Estimates of future supplies of rubber have been revised upward, but with record consumption and stockpiling, no surplus may result in the forseeable future.

The wartime neoprene rubber plant at Louisville, Ky., with a rated capacity of 132 million pounds a year, was sold to E. I. du Pont de Nemours & Co., Inc., during December. The return of this plant to private industry provides incentive for increased research effort and gives greater assurance of continued operation, the company said in an announcement on December 6.

It was indicated that the URWA union would seek an expansion of present pension and retirement systems in the industry and possibly another wage increase during 1949.

Year-End Statements Optimistic

Year-end statements of industry leaders and The Rubber Manufacturing Association, Inc., were optimistic in view of the completion of the third year in which the industry had consumed more than one million long tons of new rubber and the second year in which goods valued at an estimated 3½ billion dollars were produced.

Herbert E. Smith, since January 1 chairman of the board of the United States Rubber Co., stated that the year 1949 will be a good year for the rubber industry and business in general, according to present indications. A serious recession is not likely, but there undoubtedly will be certain fluctuations and adjustments normally experienced in a free economy.

Four major influences are at work to keep business at a high level: (1) full employment at high wages, giving the American people great purchasing power; (2) heavy expenditures by the government to finance the defense and European programs and other government activities; (3) large expenditures by manufacturers and other business groups to expand and modernize buildings and equipment; (4) shortages in some durable lines, accentuated by government purchases.

The most important rubber development of 1948 was the introduction of the new low-temperature chemical rubber which increases the tread wear of passenger-car tires 30% over the best natural rubber tires, it was said. Foam rubber production, which has been greatly expanded since World War II, will be increased further in 1949 to meet the growing demand for foam mattresses and cushioning.

Industrial rubber products, including hose, belting, packing, and vibration-dampening devices, will be in strong demand in 1949, and the production of golf balls, bathing caps, druggists' sundries, and other miscellaneous rubber products, which was substantially above the prewar level in 1948, is expected to continue in this pattern through 1949, Mr. Smith believes. Increased sales are also in sight for covered rubber thread due to the growing popularity of elastic fabrics.

P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., stated that the rubber industry's statistical data for the past three postwar years discloses a rapid peacetime conversion in 1946, the soaring tire production to an all-time high in 1947, and the leveling off to a more normal market in 1948.

Passenger tire replacement sales, wholesale, fell off sharply during the year as did truck and bus and farm tire replacements owing to the building up of adequate dealer inventories. Original equipment sales, however, increased in both passenger-car and farm tire markets, and original equipment sales of truck and bus tires approximated last year's figures.

During the three postwar years beginning with 1946, total passenger-car tire replacement sales have approximated 149,000,000, or 5.0 tires per vehicle, for the 26,500,000 passenger automobiles and light trucks which were on the highway and were more than two years old in 1948.

Mr. Litchfield pointed out that the ratio of natural rubber to total new rubber used during 1948 rose to 58%, against 42% for chemical rubber. In 1947 the ratio was about 50-50, and in 1946 only 27% natural rubber was used against 73% chemical.

Although tire dealer inventories currently are on the high side, the rubber industry looks forward to 1949 as another possible one-million-ton year. Further declines in replacement tire sales are anticipated, but original equipment sales are expected to hold up well. Truck and bus original equipment tire sales are expected to level off.

With belting and other mechanical goods continuing at a high rate of production and with the increasing use of latex foam sponge, film for packaging, rubber flooring, vinyl resins, and chemical products, the year 1949 in the rubber industry should compare favorably over-all with 1948, Mr. Litchfield concluded.

John L. Collyer, president of The B. F. Goodrich Co., declared that the American tire industry can look forward to 1949 with the expectation that an estimated two million more tires will be sold this year than in 1948.

The rubber goods industry consumed 55% more rubber in the three years since V-J Day than it did in its three previous peak years added together, he further said and explained that this point illustrates the fact that the American rubber industry has moved on to a "higher plateau of activity" in the postwar era. This condition is clearly no aftermath of the war, he added, because it has been almost a year since the backlog of demand caused by the war ceased to be a major factor so far as tires are concerned.

Mr. Collyer also said that the hundreds of thousands of dealers serving the nation's cars and trucks can expect increased tire sales in 1949 because there will be more vehicles on the highways this year than ever before in history. The country's high rate of economic activity and increasing population generate an ever-growing demand for highway transportation.

The utility and the economy of tractors and farm implements, when equipped with tires, has greatly expanded the farm tire market. By the end of 1949 the number of cars, trucks, tractors, and farm implements rolling on rubber will be more than double that in 1932, it was said.

Another factor in the substantial advance of annual rubber consumption to levels higher than even those of the "big" years just preceding the late war is the use of more and larger tires on trucks, buses, and farm vehicles. The average tire weight has increased more than 20% in the last ten years.

Mr. Collyer predicted that during 1949 there will be a continuing increase in the use of rubber for industrial applications. He said that in addition to the trend toward using rubber conveyer belts for all types of materials-handling jobs, rubber is being employed mechanically by industry in many non-transportation roles. The demand for rubber footwear, heels, soles, and other shoe products is expected to be below the postwar peak, but substantially above prewar levels.

The RMA in its statement said that when the rubber manufacturing industry took a year-end look at its amazing 1948 production records, it found solid evidence of broad, continuing markets for its products—markets far greater and underlying demand stronger than anything which had been envisaged in the early postwar period when virtually all extraordinary production was attributed to the backlog of deferred demand.

Rubber consumption in 1948 totaled an estimated 1,075,000 long tons, as compared with 1,039,000 long tons in 1946 and 1,122,000 long tons in 1947. Present forecasts indicate that rubber consumption during 1949 will be nearly as large as in 1948.

In the case of passenger-car tires output totaled an estimated 67,000,000 units in 1948, down 10 million from the year before, but ahead of 1946 and far in front of the 50,900,000 casings produced in 1940. Truck and bus tire production totaled 14,700,000 units, as against 17,754,000 in 1947, 15,832,000 in 1946 and an average of well under 10 million prior to the late war. Truck, bus, and passenger-car tube production was 72,000,000 units, down seven million from 1947.

The long-term trend toward increased consumption of rubber both in existing and new products continued in virtually all lines. This was notably true in mechanical rubber goods and in the rapidly growing field of latex foam products. To a greater or lesser degree, this trend prevailed in such other lines as rubber footwear, drug sundries, hard rubber goods, rubber flooring, rubber coated materials, and others. Nor was there any apparent interruption in the long-term trend toward the replacement by rubber of certain competing materials such as, for example, leather, steel and textiles, in such applications as footwear, containers, and conveying mechanisms and in garments and coverings, the RMA said.

The outstanding development of the year in the transportation field was considered to be the large-scale production of the extra-low-pressure tire, claimed by the industry tire engineers to give greater com-

fort and a higher degree of road safety through greater contact area than any development in a generation.

Low-temperature GR-S was hailed as the best tire tread material that has been developed, and because of this rubber's high resistance to abrasion it is expected to find wide application in certain areas of the mechanical goods field, particularly in belting.

The RMA also pointed out that although the Rubber Act of 1948 requires the industry to use a minimum of 225,000 tons of chemical rubbers a year, actual consumption was twice this amount in 1948, thanks in a large measure to voluntary consumption of GR-S which was able for the first time to compete with natural rubber on a price-quality basis.

It was also noted that a substantial improvement in natural rubber supply with the progressive restoration of producing areas in the Far East had taken place. The natural rubber producing areas have a potential variously estimated at from 1,800,000 to 2,100,000 tons a year.

It was reported in conclusion that in conformity with its long-standing policy to maintain close, working cooperation with the administrative agencies of the government, the rubber manufacturing industry through its designated advisory committees devoted much of its time through the year to the Munitions Board, the Reconstruction Finance Corp., and the National Security Resources Board in implementing the security stockpiling program and in developing plans for quick and efficient industrial mobilization of plant capacity in event of an emergency.

Further Notes on Industry Trends

In another one of his "Notes on America's Rubber Industry," Mr. Litchfield, who has entitled his latest pamphlet, "An American Story," describes 50 years of growth of the Goodyear Company.

During the past 50 years Goodyear has sold approximately nine billion dollars worth of manufactured products, the pamphlet states. The distribution of this nine billion dollars is a good illustration of the far-flung direct benefits derived from the workings of the American system of economics:

Materials 44.4%	$4,000,000,000 was expended for rubber textiles, compounds, and the hundred and one other items, both raw and manufactured, that go into the production of rubber goods.
Payrolls 29%	$2,610,000,000 was paid out in wages and salaries to Goodyear employes.
Operations 8.3%	$755,000 was the actual operational cost including fuel and maintenance of equipment: the sales expense, rentals, freight, and allied operational overhead.
Taxes 8%	$720,000,000 went to various local, state, federal, and foreign governments in the form of taxes.
Expansion 5.7%	$514,000,000 was retained in the business to provide for expansion and for plant and equipment replacements.
Dividends 2.1%	$193,000,000 was paid out in the form of dividends to the thousands of stockholders who over the years provided the capital for the ever-expanding operations.

Between the lines of the foregoing can be read the benefits that accrued to multitudes through the 50 years of Goodyear operations, Mr. Litchfield said.

There are values of vast magnitude hidden in the purchase of four billion dollars worth of raw and manufactured materials from all parts of the world—in the community support of more than 2½ billion dollars of payrolls—in the contributions to the expense of government functions, schools, fire and police protection, highways and public buildings—the expenditures for coal, electricity, rent, freight, and other haulage charges, shipping, advertising, travel of sales representatives—the erection of new plants and the purchase of new equipment to provide more jobs and increased employment—the interest, in the form of dividends, although comparatively low, that was paid to those who provided the working capital.

Each represents an integral part of our economic scheme. One cannot survive without the support of the other. Together they have provided the basis for the American standard of living, it was pointed out.

Our dominant position in the world—our well being—in fact, our future freedom depends solely upon the continued success of American business. The system of free enterprise is an American heritage that must be further enhanced if the next 50 years are to be as golden as the five decades immediately past, Mr. Litchfield concluded.

Reports from two sections of the country, Buffalo, N. Y., and Providence, R. I., indicate some drop in employment in the rubber industry. The Hewitt Rubber Division of Hewitt-Robins, Inc., in Buffalo, announced that it was laying off some workers because of a "year-end, seasonal drop in incoming orders." Most of the decline in orders has been in mechanical rubber lines, but the foam sponge department has also made a reduction in force because of delays by auto manufacturers in bringing out new models, it was said.

The Rhode Island State Department of Labor reported on November 28 that there was a decline of 116 workers employed by the rubber industry in that state during October, as compared with the September figure. The total employment in the industry of 7,114 was lower by 577 persons than the peak employment in February, 1948. The worst that can be said for the rubber situation in Rhode Island is that it is spotty. Some lines are going great guns; while others are lagging.

Valued at $10,820,476, October exports of rubber products from the United States interrupted the downward trend in such exports which fell to $8,325,412 in September after a steady drop from the postwar high of $21,981,297 in May, 1947, the Department of Commerce reported on December 13. Analysis of these figures shows that nearly all classes of rubber goods contributed to the increase in exports in October, amounting to 30% gain over September shipments. Bulk of the increase, however, was in transportation items, with exports of casings and tubes, except passenger car, showing the sharpest up-turns.

Among the 1948 exports of non-transportation rubber manufactures, shipments of belting, hose, and packing, and the "all other" class, have shown the smallest declines from 1947 levels.

During the first 10 months of 1948, exports were valued at $112,249,194, a decline of 39.9% from the $186,844,723 reported for the comparable period of 1947.

In its regular monthly tire report, the RMA stated that manufacturers' shipments of passenger tires in October totaled 5,275,505 units, a reduction of 4.6% from September when 5,530,848 casings were shipped.

Production of passenger tires also declined to 5,560,088, against September production of 5,740,418, and inventories were up slightly to 8,002,433 from 7,848,143 on September 30.

Shipments of truck and bus tires rose in October to 1,210,021, as compared with 1,169,488 in September. Production was also up slightly to 1,190,212 casings, compared with 1,174,108 the previous month. Inventories declined to 902,830 from 1,957,080.

Shipments of automotive tubes were down 2.3% in October to 6,060,516, against 6,200,044 in September; while production was up 2.1% to 6,323,006, compared with 6,191,462 in the previous month.

Rubber Production, Consumption, Etc.

World production of natural rubber in October was estimated by the Secretariat of the Rubber Study Group at 125,000 long tons, a decline of 20,000 tons from the record September figure, according to a Department of Commerce release dated December 7.

Total world output for the first 10 months of the year is estimated by the Secretariat at 1,247,500 tons, an increase of 215,000 tons over the corresponding period of 1947.

The October figure reflects a low Malayan output of 50,500 tons and reduced Indonesian exports of 38,700 tons, which represented declines of 13,800 tons and 12,900 tons, respectively, from September figures. Nevertheless the October figure virtually equaled the 1948 monthly average to date. Native rubber exports from Indonesia were 30,400 tons in October, compared with the monthly average of 28,200 tons during the record year, 1941.

World consumption of natural rubber in October, influenced as before by large imports into Russia (counted as consumption), is estimated at 130,000 tons, a new high and greater than production for the first time since February, 1948. Consumption for the first 10 months of the year is estimated at 1,145,000 tons, an increase of 257,500 tons over the like period of 1947.

World output of chemical rubber, excluding Russia, is estimated at 45,000 tons in October, bringing the total for 10 months to 445,000 tons. October consumption, also excluding Russia, is estimated at 40,000 tons, and January-October consumption at 407,500 tons.

Total world consumption of natural and chemical rubber in the first 10 months of 1948 is estimated at 1,552,500 tons, 130,000 tons, or 9%, higher than in the comparable period of 1947.

Natural rubber production capacity is highlighted in the November issue of "Industry Report—Rubber" as prepared by Everett G. Holt, of the Department of Commerce. New tentative estimates of the full-out potential capacity of rubber plantations based on postwar developments thus far suggest a figure of 2,100,000 long tons a year. These estimates have not visualized an *actual* production in excess of 1.8 million tons in any one of the next five years, but there now seems to be a possibility that actual production within two or three years might attain a rate of 1.9 million tons or more under favorable conditions, as and if Indonesia and Indo-China approach full output. Malaya in 1948 is producing nearly 95% of its estimated 750,000-ton potential capacity, thus demonstrating that practical operations can exceed the 90% formerly considered a probable maximum, Mr. Holt states.

There is a possibility that no world surplus of rubber will be realized during the next ten years, unless in some temporary period of unusual trade depression, he added. A comparison of peak, low, and average world rubber consumption in each 10-year period since 1910 is used to emphasize that *average* world consumption was always greater than *estimated* con-

sumption. Consumption of rubber for 1948 is estimated at 1.9 million tons.

Of special interest in this November issue of "Industry Report—Rubber" is a special statement prepared by the Commerce Department's Rubber Division, showing the consumption of natural and total chemical rubber divided between transportation and non-transport goods, annually for 1942 and 1943 and quarterly thereafter through 1947. For the 1942-45 period the statistics are further subdivided between goods for direct military use and for all other uses.

The monthly report of the RMA showed total rubber consumption for November at 89,378 long tons, up about 1½% from October. Consumption of natural rubber during November was 51,569 tons, about 3.7% higher than in October. Consumption of synthetic rubbers was 37,809 tons, a reduction of 1.3%, and was used by types as follows: GR-S, 29,013 tons; neoprene, 2,933 tons, Butyl, 5,023; all other, 840 tons.

NAITD Suit Postponed

The suit of the National Association of Independent Tire Dealers against the six rubber companies, Goodyear, Goodrich, Firestone, Tire & Rubber Co., U. S. Rubber, General Tire & Rubber Co., and Lee Rubber & Tire Corp., for "conspiracy to raise, fix, maintain and make uniform and non-competitive prices" for tires and tubes contrary to anti-trust laws, scheduled to begin in Federal District Court in Washington, D. C., on December 8, was postponed until January 5. The Association, which has filed suit against the six tire manufacturers for $4,266,000, has maintained that the manufacturers showed sales discount favoritism to large-scale distributors to the disadvantage of the independent tire dealers.

In connection with the suit, James B. Sharkey, general manager of the NAITD, stated before the House Small Business Committee that 23.7% of tires at wholesale are going to oil companies, compared with 15.5% in 1941, and that the loss of replacement sales by independent tire dealers has not been due to inability to serve the market properly, but rather because controlling factions in the industry have acquired the necessary faculties to consolidate, absorb, eliminate, and destroy smaller competition.

Another Anti-Trust Suit Filed

Another anti-trust suit was filed by the Justice Department in the Federal Court in Cleveland, O., against U. S. Rubber, Consolidated Rubber Manufacturers, Ltd., of New York and London, England, and Dunlop Rubber Co., Ltd., of London. In addition, the suit names 13 foreign companies as participants in a conspiracy to divide world markets in latex products, including rubber thread, elastic yarn and fabrics, and other articles made from such thread or yarn, by unlawful agreements not to sell or ship these products to a territory allocated to another co-conspirator.

It is also alleged that the defendants and co-conspirators have established a worldwide patent pool and have organized jointly owned companies whose manufacturing and selling operations have been restricted to designated territories. The complaint states that as some of the effects of the unlawful conspiracy, the competition among the defendants and co-conspirators has been eliminated throughout the markets of the world, and that exports and imports of the United States have been restricted.

The complaint also points out that, while the late war caused some minor alterations in the operations of the cartel, the basic cartel arrangements have, nevertheless, continued in existence.

RFC Sells Neoprene Plant to du Pont

Harley Hise, chairman of the board of the Reconstruction Finance Corp., announced on December 6 that RFC had sold its wartime neoprene plant at Louisville, Ky., consisting of approximately 214 acres of land and 76 buildings with more than 818,000 square feet of floor space, together with machinery and equipment, for $13,200,000, to E. I. du Pont de Nemours & Co. This plant, with a rated capacity of 132 million pounds a year, has produced neoprene, a special-purpose type of chemical rubber, at the rate of between 50 and 60 million pounds a year for the past two or three years.

Since production was begun in 1942, this plant will have earned for RFC, before depreciation, approximately $25,800,000 as of December 31, 1948, which together with the sales price totals more than RFC's wartime investment in the plant of approximately $37,740,000.

The sale was effective as of December 31, 1948, subject to the National Security Clause provisions as established by the National Security Resources Board.

Du Pont in a statement, also issued on December 6, called attention to the fact that neoprene, a product of du Pont research, was the only chemical rubber manufactured in substantial quantities in the United States at the beginning of World War II.

Construction of neoprene facilities at Louisville was started by du Pont for commercial production. They were taken over by the RFC in 1942 under its wartime synthetic rubber program. Du Pont operated and considerably expanded the plant for the corporation.

Under the repurchase agreement du Pont, regardless of any difficulties involved, must maintain for national security a productive capacity in the plant of not less than 45,000 long tons of neoprene a year for at least five years. The obligation may be extended for an additional five years at the government's option.

"The return of this plant to private industry provides incentive for increased research effort and thereby gives greater assurance of continued operation," the du Pont statement also said.

The price of neoprene will remain the same, and an announcement by C. A. Bartle of the rubber chemicals division of du Pont, likewise dated December 6, gave details of ordering procedure under the new ownership. Purchase permits are, of course, no longer required, and all orders for all types of neoprene should now be mailed to E. I. du Pont de Nemours & Co., Inc., Rubber Chemicals Division, Wilmington, Del.

Present operations at the Louisville plant involve about 950 persons, and it is understood that operations will continue as usual with the same number of persons employed.

Industrial Relations News

The URWA announced in mid-December that a campaign to increase the number of workers' pension systems in the rubber industry and to broaden those already in existence was being prepared. This campaign and the union's wage program is expected to be completed some time in February.

A spokesman for the union said that a survey of existing pension plans disclosed them to be "entirely inadequate" in that they did not afford sufficient benefits to the retired workers, and the workers have no voice in the administration of the plans. It was added that the union felt that the rubber companies could afford to bear the costs of pension plans because of their record profits and tremendous financial reserves.

The pension committee of the union will present a complete report on its findings, along with recommendations, to its executive board at a meeting in February. Meanwhile the union's international policy committee is expected to draw up a wage program which will be submitted to all local unions immediately after it has been announced.

The Dewey & Almy Chemical Co.'s industrial relations with the local International Chemical Workers Union, AFL, at its Cambridge, Mass., plant was the subject of a publication of the National Planning Association's Case Study No. 3 under the title of "Causes of Industrial Peace under Collective Bargaining." The report describes the nine-year growth of a healthy working relation between Dewey & Almy and the local union. There has been no acute strife and only one minor work stoppage at the company since it was unionized in 1939.

Five reasons for the peaceful and healthy picture at Dewey & Almy were given. *First*, in point of time, there was top management's early acceptance of the union and its sincere desire to develop a healthy relation. *Second* was the development of skill and competence, and the assumption of responsibility for industrial relations by the line management organization down through the foremen. *Third* has been effective communications within the management organization and between the management and the union. *Fourth* has been the degree of autonomy enjoyed by the local union. It has been free to develop, within wide limits, its own policies and procedures for collective bargaining and to adjust its demands to the unique circumstances of the particular company with which it deals. *Fifth* has been the specific policies, practices, and procedures adopted. Their importance, however, must not be overemphasized. They are reflections of the underlying attitudes of management and the union about, and toward, each other; by and large, they are effects rather than causes, the report stated.

The president of Dewey & Almy is Bradley Dewey, who was wartime Director of the Government Synthetic Rubber Program.

Chemical Markets Meeting

To present the chemical markets field to technically trained students in the Metropolitan New York Area, the Polytechnic Institute of Brooklyn and the Chemical Markets Research Association will sponsor a joint all-day meeting at the Hotel Biltmore, New York, N. Y., on February 10. The meeting will provide an opportunity for students to find out about the rapidly developing outlets in this new division of the chemical industries. Faculty members from the chemistry and chemical engineering departments of Polytechnic and representatives from industry will also attend the meeting. Lawrence Flett, National Analine Division of Allied Chemical & Dye Corp., is chairman of the joint committee for the meeting.

EAST

National Power Show

The Eighteenth National Exposition of Power & Mechanical Engineering took place November 29 to December 4 at Grand Central Palace, New York, N. Y. The exposition was held in conjunction with the annual meeting of the American Society of Mechanical Engineers, November 29 to December 3, at the Hotel Pennsylvania. One of the largest to date, the exposition occupied four floors of the Palace and consisted of some 374 exhibits, which covered the entire field of power generation, conversion, distribution, and application and were viewed by a record attendance.

Exhibit classifications included heat and power production units, such as boilers, turbines, steam generators, burners, and diesels; power distribution, including piping, valves, controllers, and regulators; auxiliary equipment, such as feeding systems, safety appliances, and level controls; instruments, including gages, flow meters, recording and controlling apparatus; machinery, transmissions, pulleys, belts, drives, couplings, bearings, and gears; materials handling by means of hoists, conveyers, and trucks; engineering materials of all types; and machines and tools.

Exhibitors of steam generators included Ames Iron Works, Oswego, N. Y.; Cyclotherm Corp., New York; New York Steam Generator Sales Co., Orr & Sembower, Inc., Reading, Pa.; and Superior Combustion Industries, Inc., New York. Steam traps, gages, and auxiliary equipment were shown by Armstrong Machine Works, Three Rivers, Mich.; Crosby Steam Gage & Valve Co., New York; Grove Regulator Co., Oakland, Calif.; Sarco Co., Inc., New York; and A. Schrader's Son Division of Scovill Mfg. Co., Brooklyn, N. Y. Displays of valves of all types were much in evidence and included exhibits by Barco Mfg. Co., Chicago, Ill.; Falstrom Co., Passaic, N. J.; Jenkins Bros., New York; Johnson Corp., Three Rivers, Mich.; Leslie Co., Lyndhurst, N. J.; Milton Roy Co., Philadelphia, Pa.; John Waldron Corp., New Brunswick, N. J.; and Yarnall-Waring Co., Philadelphia.

Industrial uses of rubber in V-belts, packings, conveyer belting, and other applications were shown by Dayton Rubber Mfg. Co., Dayton, O.; Garlock Packing Co., Palmyra, N. Y.; Gates Rubber Co., Denver, Colo.; B. F. Goodrich Co, Akron, O.; Greene, Tweed & Co., North Wales, Pa.; and Union Asbestos & Rubber Co., Cicero, Ill. Thermal insulations of various types were exhibited by Eagle-Picher Sales Co., New York; Johns-Manville Sales Corp., New York; Keasby & Mattison Co., Ambler, Pa.; and Owens-Corning Fiberglas Corp., Toledo, O. Industrial lubricants for power application were featured by Gulf Oil Corp., Pittsburgh, Pa., and Shell Oil Co., Inc., Socony-Vacuum Oil Co., Inc., Texas Co., and Tide Water Associated Oil Co., all of New York.

Among the other exhibits of interest were displays of power plant engineering by Blaw-Knox Co., Pittsburgh; magnetic separators by Eriez Mfg. Co., Erie, Pa.; slabs of low-temperature rubber by Gates Rubber; gear reducers by Reeves Pulley Co., New York; liquid freezing systems by % Proportioners %, Providence, R. I.; and recording meters and control instruments by Cambridge Instrument Co., Inc., Cambridge, Mass.

C. S. Hancock

Diamond Alkali Co., Union Commerce Bldg., Cleveland, O., has advanced C. S. Hancock, on the sales staff of the pure calcium products division since 1936, to manager of calcium carbonate sales. Mr. Hancock joined Diamond at its Pittsburgh offices back in 1925 and shortly thereafter was transferred to Painesville, O., where he was advanced to the post of treasurer of what was then known as the Pure Calcium Products Co. When this concern was incorporated into the Diamond organization in 1936, Mr. Hancock became active in the sale of precipated calcium carbonates to the paint, rubber, and printing inks industries.

John A. Sargent has been made executive vice president of Diamond Alkali. He had been vice president of finance since May, 1947, and had joined the company as its treasurer in September, 1946.

Binney & Smith Co., 41 E. 42nd St., New York 17, N. Y., has announced that its foreign business in compounding materials, pigments, and machinery for the rubber industry will now be handled solely through a wholly owned subsidiary to be known as Binney & Smith Co. International. Norman Lee Smith, vice president of the parent company, will continue as vice president of Binney & Smith International; while Edwin B. Brooks, export manager of Binney & Smith Co., becomes manager of the new firm, which also maintains offices at 41 E. 42nd St.

W. T., LaRose & Associates, Inc., manufacturer of thermall electronic heating equipment for the plastics, rubber, and wood industries, have moved its entire manufacturing plant to new and larger quarters (60,000 square feet floor area) at 31 Ontario St., Cohoes, N. Y., one mile from its previous address in Troy, N. Y. The move has been completed with a minimum interruption of production. Engineering and manufacturing facilities have been enlarged to handle the increased demands for new Thermall equipment recently introduced in the rubber and plastic industries.

New York Quartermaster Purchasing Office, 111 E. 16th St., New York, N. Y., recently received bids on 5,492 pair of rubber firemen's boots.

Litchfield Honored by RMA

Paul W. Litchfield, chairman of the board of Goodyear Tire & Rubber Co., Akron, O., was awarded a sterling silver cigar box in honor of his 50 years of service to the rubber industry. The presentation was made by A. L. Viles, president of The Rubber Manufacturers Association, Inc., at a luncheon at the Union League Club, New York, N. Y., on December 18, attended by more than a score of prominent rubber officials. The inscription on the box read: "Paul W. Litchfield, in honor of his 50 years of service to the rubber industry, from his associates on the board of directors of the Rubber Manufacturers Association." Among those present were Goodyear President E. J. Thomas and Vice Presidents P. E. H. Leroy and R. S. Wilson; H. E. Smith, board chairman of United States Rubber Co.; Lee Jackson, president of Firestone Tire & Rubber Co.; Penfield Seiberling, president of Seiberling Rubber Co.; William O'Neill, president of General Tire & Rubber Co.; H. E. Humphreys, Jr., president of U. S. Rubber; and J. J. Newman, vice president of The B. F. Goodrich Co.

"Men of Science" Dinner

The annual "Men of Science and Industry Dinner," sponsored by the American Council of Commercial Laboratories, was held December 3 at the Mayflower Hotel, Washington, D. C. Rear Admiral Thorvald A. Solberg, chief of the Office of Naval Research, was principal speaker at the dinner which has become one of the outstanding gatherings of research and development administrators, particularly in government service, of the year. Also participating in the program were John R. Steelman, presidential assistant, and Edward U. Condon, director of the National Bureau of Standards. The Council, composed of 41 leading commercial research and testing laboratories, had as dinner guests many officials representing the various government scientific organizations as well as representatives from all types of industry.

"Britt" Wilson Feted

B. Brittain Wilson, vice president of Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y., was the guest of honor at a cocktail party at the Ambassador Hotel on December 1, upon completion of 50 years of service with the Bill Brothers publications. Mr. Wilson joined the parent firm, Edward Lyman Bill, in 1898 as office boy. He became manager of the India RUBBER WORLD in 1932 and vice president of Bill Brothers in 1936, both positions he holds today.

The party at the Ambassador Hotel held in his honor was attended by both present and past members of the staff of Bill Brothers publications. A clever skit highlighting the important events of Mr. Wilson's life was presented by six staff members. He was also presented a player-piano roll, "It's Nice Work If You Can Get It," signed by all the members of the company.

The Rubberset Co., brush manufacturer in Newark, N. J., last month celebrated its seventy-fifth anniversary.

J. M. Huber Corp., producer of carbon black, oil and gas, kaolin clay, and printing inks, has expanded its New York, N. Y. offices, at 342 Madison Ave., to include the office of the director of purchases and the finance and accounting departments of the corporation, formerly at the Brooklyn plant. Moving to New York are Treasurer R. J. Cashion and his assistants and Director of Purchases E. M. Krech. Purchasing office of the ink division will remain in Brooklyn under the direction of Charles Cubbison.

Huber recently sent a copy of its new 26-page booklet, "Employe Benefits," to every one of the company's 1,200 employes. After reviewing in brief the operations of the company and the applications of its products, the booklet gives simple discussions of some 19 benefits available to its employes, including death, funeral, and injury benefits, severance pay, sick leave, unemployment insurance, recreational facilities, bonus and profit sharing plan, and retirement plan.

The Colonial Insulator Co., Akron, O., recently completed a large, new office and factory building which is adding 15,000 square feet to its present plant buildings on Grant St., according to Ray Hemphill, vice president and general manager. Colonial Insulator is one of the country's largest producers of electrical porcelain and is the only producer of porcelain rubber glove forms on which electrical, surgeons', and household rubber gloves are made. The company ranks with Akron's oldest concerns, having been established in 1894 by J. R. Hemphill and W. H. Motz, both of whom are still living.

Esso Standard Oil Co., 15 W. 51st St., New York 19, N. Y., has announced the first commercial production of synthetic iso-octyl alcohol by the new process. The alcohol is used in the production of plasticizers for the plastics industry, and its full-scale production is expected to help relieve current shortages in plasticizers. The alcohol is made by an adaptation of the Oxo process and involves the reaction of a selected gasoline fraction with hydrogen and carbon monoxide gases in the presence of a special catalyst at pressures up to 3,000 p.s.i. The process is flexible, and other alcohols and chemicals can be made from it. The process culminates three years of extensive experimentation by Standard Oil Development Co. A continuous method was developed at Esso's Baton Rouge, La., laboratories where a small plant was converted for operation of the process. The company is also considering the conversion of a larger plant formerly used for oil hydrogenation to increase further production of iso-octyl alcohol.

Erie Engine & Mfg. Co., Erie, Pa., recently developed a new 42- by 42-inch press with a 24-inch ram, with self-contained individual pumping units, automatic controls, and other features, and has sold a number of them on the merits of the press itself, which is illustrated herewith.

The company has also recently issued a folder illustrating nine of its presses made for the rubber and the plastic industries, ranging from one-platen presses to eight, and in various sizes and types. The folder contains a table for determining press sizes in relation to ram and line pressures.

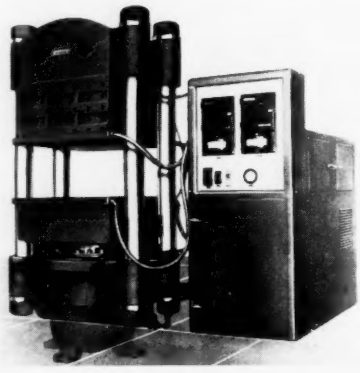
Bakelite Expands Production

Expanded plastics manufacturing facilities have enabled Bakelite Corp. to increase average productive capacity by approximately 50-60% during 1948. Further increases in facilities, most of which are already well under way, will be completed during 1949 as part of the most extensive plant expansion program in the company's history. The expansion program includes the completion of an entirely new plant at Ottawa, Ill.; additions to facilities at South Charleston, W. Va., Texas City, Tex., and Bound Brook, N. J.; and new plants in West Bath, Me., and Belleville, Ont., Canada.

The new Ottawa plant is now processing vinyl resins into plasticized films, sheeting, and rigid sheets at a rate which more than doubles the company's previous capacity for such products. Production capacity of Vinylite resins was greatly increased at South Charleston during 1948, and the new Texas City plant is in operation on a limited scale. Combined production of both plants, when operating at full capacity during 1949, will be more than double the early 1948 rate.

Capacity for production of polyethylene resins at South Charleston will be increased by more than 100% during the middle of 1949. The increase in facilities at Bound Brook during the past year resulted in increases of approximately 30% in the production of phenolic molding materials and other phenol-formaldehyde products. The production of polystryene has also started at the Bound Brook plant. The new Belleville plant now under construction, and expected to be in operation by the latter part of 1949, will produce phenolic plastics and resins and urea resin adhesives. Construction has also begun on the West Bath plant, to be completed about the middle of 1949, which will produce woodflour and fill part of the company's expected woodflour requirements.

Taylor Instrument Cos., Rochester, N. Y., has issued a revised edition of its bulletin, "Taylor Guide to Correct Instrument Selection." This publication, Bulletin 98170, is a revision of a previous bulletin which has been out of print for some time and is the result of numerous requests to the company for a listing of its entire industrial line. Besides listing all instruments, the new bulletin also covers the field of application of each type of instrument, its principle of operation and range limits.



New Erie Engine Press

Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., has announced the expansion of its market research department to cover four forms of service, as follows: (1) Market Research, consisting of special investigations covering market and sales analysis, market and product development, and market forecasts; (2) Market Brief, an inexpensive outline report covering present production, producers, and direct consumers; (3) Chemical Index, abstracted chemical market information taken from the Snell company files; and (4) Monthly Chemical Report, providing up-to-date monthly market reports on individual chemicals.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that its rubber chemicals division, effective January 1, will limit its sales of color to the rubber industry to rubber dispersed colors, water dispersible colors, and color pastes. All other pigment colors, including dry rubber colors, will be sold by the company's pigments department. This change has been made to enable both departments better to serve the rubber industry. Future orders for dry colors should be placed with the nearest branch office of du Pont's pigments department. These offices are in Malden, Mass., New York, N. Y., Philadelphia, Pa., Chicago, Ill., Wilmington Del., Cleveland, O., Houston, Tex., and Pasadena and San Francisco, Calif. Van Waters & Rogers, Inc., with offices in Portland and Seattle, Oreg., is agent for the pigments department.

Charles T. Mentzer, Jr., assistant manager of fine chemicals sales in the organic chemicals department, E. I. du Pont, has been named sales supervisor in the department's New York office. Mr. Mentzer has been with du Pont since 1929 and for more than six years was a research chemist. He moved to the department's Chicago sales office in February, 1937, and was recalled to Wilmington as assistant to the director of sales in 1942.

Navy Purchasing Office, 111 E. 16th St., New York, N. Y., recently issued invitations to bid on women's bathing caps, women's service rubber overshoes, rubber shower mats, rubber matting, and rubber work gloves.

Hewitt-Robins, Inc., Buffalo, N. Y., has announced that Walter K. Benchley, special assistant to the chief engineer during the company's five-year expansion program in Buffalo has been reappointed purchasing agent of the Hewitt-Rubber Division. The completion of major phases of the expansion program permitted return of Mr. Benchley to the post he previously held for 10 years.

At the same time William A. Fleischman was named to the newly created position of purchasing agent for the Restfoam Division. Mr. Fleischman, who joined the company in 1922, was formerly assistant purchasing agent of the Hewitt division.

A new pillow made entirely of latex foam, and described as a boon to allergy sufferers, has been developed by the Hewitt Comfort Institute. Actually scores of tiny pillows in one, the new pillow is a companion to the Restfoam mattress introduced last spring, and both are manufactured by the company's Hewitt Restfoam division. Unlike feather pillows, the latex pillow always retains its resiliency and buoyancy and never mats or develops lumps, it is claimed.

Davis Retires; Smith, Others Advanced by U. S. Rubber

Herbert E. Smith, president of United States Rubber Co., Rockefeller Center, New York 20, N. Y., became chairman of the board and chief executive officer of the company January 1, and Harry E. Humphreys, Jr., vice president and chairman of the finance committee, became president and chairman of the executive committee.

Mr. Smith and Mr. Humphreys were elected at a directors' meeting December 8, when F. B. Davis, Jr., chairman of the board and chief executive officer for 20 years, announced his retirement effective December 31. Mr. Davis, however, continues as a director and a member of the finance committee.

At the same meeting Arthur Surkamp, treasurer, was elected vice president and chairman of the finance committee to fill the vacancy created by Mr. Humphreys' promotion. Mr. Surkamp was also made a director and a member of the executive committee. Herbert M. Kelton, general auditor, was elected treasurer.

Mr. Smith started his rubber career 35 years ago as a salesman in California, his native state. His first job was to sell mechanical rubber goods to shipowners along the San Francisco waterfront. He rose step by step to the top sales position in the company. In 1929 he was made a director, and in 1942 he was elected president, chairman of the executive committee, and a member of the finance committee.

Mr. Humphreys, a native of Philadelphia, began his business career as an office clerk at the age of 17. Interested in finance, he went to night school to study the subject. In 1924 he became an auditor in a public accounting firm and later entered the investment business. In 1938, Mr. Humphreys was elected vice president, director, and a member of the finance and executive committees of U. S. Rubber. Four years later he was made chairman of the finance committee and vice chairman of the executive committee.

Mr. Surkamp has been with the company nearly 30 years. His first job was to organize the company's employment office in New York. Later he was appointed assistant cashier of U. S. Rubber Plantations, Inc. In 1929 he was made comptroller, a position he held until 1940, when he was elected treasurer upon consolidation of the two responsibilities.

Mr. Kelton came to the company in 1929 as manager of the audit section, comptroller's department. One year later he was made assistant comptroller and in 1940 general auditor.

U. S. Tires division has opened a sales branch at 167 Ottawa Ave., N. W., Grand Rapids, Mich., with Elmer R. Clarkson sales manager of this branch.

Mr. Clarkson joined the company in June, 1942, as statistician and manager of investigation at the Marion, O., shell-loading plant, a U. S. Rubber wartime operation. He was transferred to the Detroit branch in 1943 as assistant to the district manager, was later made manager of commercial sales for that area, and in 1947 was appointed assistant district manager at Detroit, the post he held prior to his current promotion.

Goodyear Promotions

The chemical division of The Goodyear Tire & Rubber Co., Akron, O., has named R. T. Hickcox West Coast manager with headquarters in Los Angeles, and C. O. McNeer manager of the Chicago district. Both men were with the plastics and coatings department, from which the chemical division was formed.

Mr. Hickcox has been with Goodyear for 18 years. Before returning to California as special representative of the chemical divison, he completed an extensive tenure of service in the research division.

Mr. McNeer has been with Goodyear for 14 years. Formerly the special representative of the chemical division in the Cincinnati area, Mr. McNeer has had wide experience in the manufacture and application of films and coatings.

Named district sales managers for the chemical division were John Hussey in the New England area and E. J. Hill in the Cleveland district. Both men also were representatives of the former plastics and coatings department.

Mr. Hussey, a veteran of 14 years with the Goodyear organization, will be stationed in Boston, Mass.

Mr. Hill was transferred from Detroit to Cleveland where he will manage the now consolidated territories. Mr. Hill is another chemist of long experience who joined the predecessor of the chemical division in 1945.

A. W. Dunn, of the public relations department at Goodyear, has been transferred to the aviation products division as manager of its Dayton, O., office. An experienced pilot, Mr. Dunn will serve as the company's representative at Wright Field.

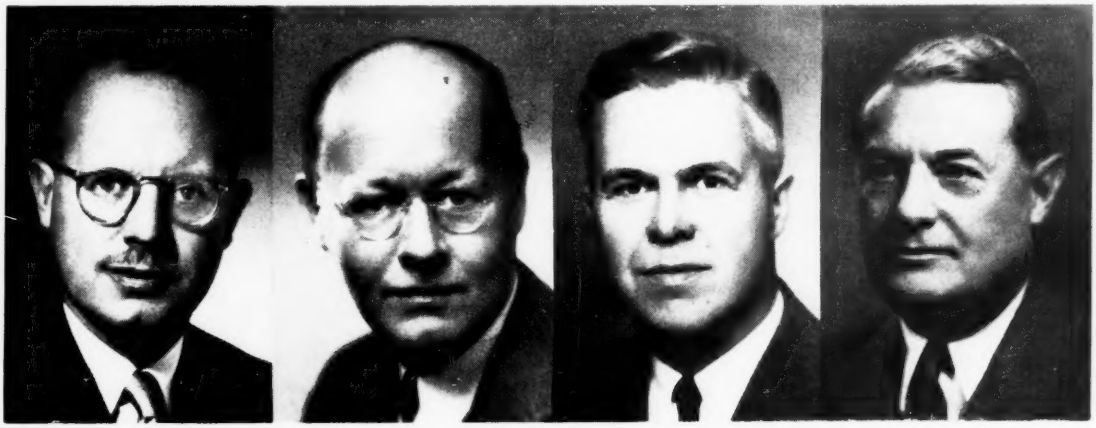
W. S. Martel was recently appointed manager of automotive jobber sales for Goodyear. Mr. Martel has been affiliated with rubber firms, with one exception, since 1908.

Two members of Goodyear's aviation products division were elected to top posts in the Aviation Distributors & Manufacturers Association during its recent sixth annual meeting in Cleveland, O. R. W. Richardson, manager of the Goodyear division is the new vice president of the manufacturers division of the Association; while A. M. Recker, manager of distributers sales for Goodyear, was reelected a director of the Association for the third time.

New emphasis on United States airpower has reformed the Boeing Airplane Co.-Goodyear Aircraft Corp. team for the production of heavy bombers for the Air Force. Goodyear Aircraft served as one of the major component parts manufacturers for Boeing during the war to keep the B-29 assembly lines moving and now has been called on to aid in the production of the new B-50 bomber. First on the list of Goodyear Aircraft parts for the new bomber is the 135-pound aluminum and Plexiglas nose cone for the bombardier's station. Under sub-contract from General Electric Co., Goodyear is also building sub-assemblies for the two- and four-gun turrets to be mounted in the bomber.

Endicott Johnson Corp., Endicott, N. Y. has elected President George W. Johnson chairman of the board to succeed his father, the late George F. Johnson; while Charles F. Johnson, Jr., vice president and general manager, succeeds his uncle as president and will continue also as general manager. The new chairman's son, Frank A. Johnson, was made vice president.

Ferro Chemical Corp., Union Commerce Bldg., Cleveland 14, O., has appointed Hodges-Truesdale Co., 152 Sixth St., Cambridge 42, Mass., sales agent for the New England territory for Ferro products, including metallic soaps, driers, fungicides, and stabilizers for the paint and varnish, printing ink, petroleum, textile, marine, plastic, lumber, and rubber industries.



All photos, Pach Bros.

Harry E. Humphreys, Jr. **Arthur Surkamp** **Herbert M. Kelton** **Herbert E. Smith**

Changes at Firestone

Samuel W. String, Jr., has been appointed comptroller of the Firestone Industrial Products Co., Akron. Mr. String was promoted from a similar position at the Firestone Rubber & Latex Products Co., Fall River, Mass., a subsidiary of Industrial Products.

Paul R. Anderson, on the comptroller's staff of The Firestone Tire & Rubber Co. in Akron, is Mr. String's successor at Fall River.

Rex P. Cosgrove, formerly with Cooper Tire & Rubber Co., Findlay, O., has joined the technical staff of the Firestone plant at Noblesville, Ind.

Firestone is erecting an addition, to cover 50 by 150 feet, at an approximate cost of $25,000, at its plant at 2651 Gage Ave., Los Angeles, Calif.

Promoted by Goodrich

Robert Lee Reeves has been named manager of store merchandising for The B. F. Goodrich Co., Akron, O. He formerly was manager of sales planning in the replacement tire sales division.

James McCready has assumed new duties in the sales promotion department of the industrial products sales division. He had been in the Boston district of the division as sales promotion man since he joined Goodrich in August, 1946.

Ray Thomas has been made supervisor in the retail service supervision department of the replacement tire sales division. He joined Goodrich in 1933, as a factory employe in the industrial products division, became a floor foreman in the deicers department, aeronautical products, in 1940, a shift foreman a year later, and then a shift foreman in the company's plant at DuBois, Pa., and for the last year was general foreman in the fuel cells department in the Akron plant.

Dale Kramer, on a leave of absence from Goodrich since last March, has rejoined the company and been assigned to the auto and home supply department. Mr. Kramer came to Goodrich in 1933 as a clerk in the sales personnel department, later was named operations manager of field personnel, during the war he served in the Army Air Forces, and was director of field sales personnel when given the leave.

Pennsylvania Rubber Co., Jeannette, Pa., conducted a series of branch sales meetings throughout the country from December 9 through January 11. R. B. Cave, vice president in charge of sales; E. V. Duffy and James Hughes, assistant sales managers; and Robert L. Baumgardner, advertising manager, conducted the series of six meetings held in Greensburg, Pa.; Atlanta, Ga.; New York, N. Y.; Chicago; Kansas City; and Los Angeles. Subjects for discussions included forthcoming sales and advertising plans for 1949 and the complete line of new and old automotive products. Pennsylvania territory salesmen, branch managers, office managers, and service managers were present at these sessions.

Kent W. Fuller, Jr., has been named New York territory salesman for Pennsylvania Rubber. Mr. Fuller, formerly with Gulf Oil Corp., served as president of Fuller Tire & Supply Co. prior to his present appointment.

WEST

Mission Rubber Co., 5001 Firestone Blvd., South Gate, Calif., according to President Herman D. Rue is expanding its factory facilities to manufacture latex foam in sheets and molded articles, to be sold under the "Elastex" trade name. The expansion program, costing $50,000, includes an increase of 3,600 square feet of floor space. The company has been making blown rubber sponge sheets and molded items under the name, "Elasticell."

Gates Rubber Co., Denver, Colo., states that it is the first producer of industrial rubber hose to have a commercial supply of the new low-temperature rubber available. As production is increased at the Copolymer plant at Baton Rouge, La., the company will have an ever-increasing supply for incorporation into Gates industrial hose wherever the greater abrasion resistance of the low-temperature rubber will result in an increase in the service value of the hose to the user. Tests have proved that the rubber made by low-temperature polymerization, which provides greatly increased control over the molecular structure, withstands abrasion up to 40% longer than does the best natural rubber.

Gates has also leased a one-story building at 593 S. 21st St., Irvington, N. J., to be used for warehouse and sales purposes formerly conducted in Hoboken.

Monsanto Chemical Co., St. Louis, Mo., has appointed Paul C. McMillan manager of the newly created San Francisco, Calif., office of the company's export sales department, at 111 Sutter St. Mr. McMillan formerly was in the company's New York export sales office.

Thomas J. Martin has been made branch sales manager at Detroit for Monsanto's plastics division. Mr. Martin, at present branch sales manager at St. Louis, will replace Carl H. Whitlock, whose resignation will be effective January 1, 1949. Mr. Martin will be succeeded at St. Louis by Jack W. Porte, now assistant branch sales manager at Chicago.

National Sporting Goods Jobbers & Manufacturers Exhibition, scheduled for the new Chicago Coliseum, Chicago, Ill., January 22-28, has been canceled.

Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill., has announced that effective January 1 its wholly owned subsidiary, Indoil Chemical Co., at the same address takes over the personnel and sales activities of Standard's chemical products department. This move is being made to permit more efficient handling of the company's chemical business on a nationwide basis. The chemical products to be sold by Indoil include Indonex plasticizers, Indopol polybutenes, Indocene aromatics, Alkanesulfonic acids, Indoil sulfonates, and others.

NEWS ABOUT PEOPLE

Wallace De Laney, chairman of the board, president, and a director of The Faultless Rubber Co., Ashland, O., last month resigned all three offices in order to devote his time to research and development projects in connection with the rubber industry and to consulting services for rubber companies generally. Mr. De Laney plans eventually to return to New England. His successor at Faultless as president of the company is T. W. Miller, Jr., formerly a vice president and a director. Mr. Miller, oldest son of T. W. Miller, Sr., founder of the company, has been with the organization in various capacities since 1936 except for four years in the Armed Forces during the late war.

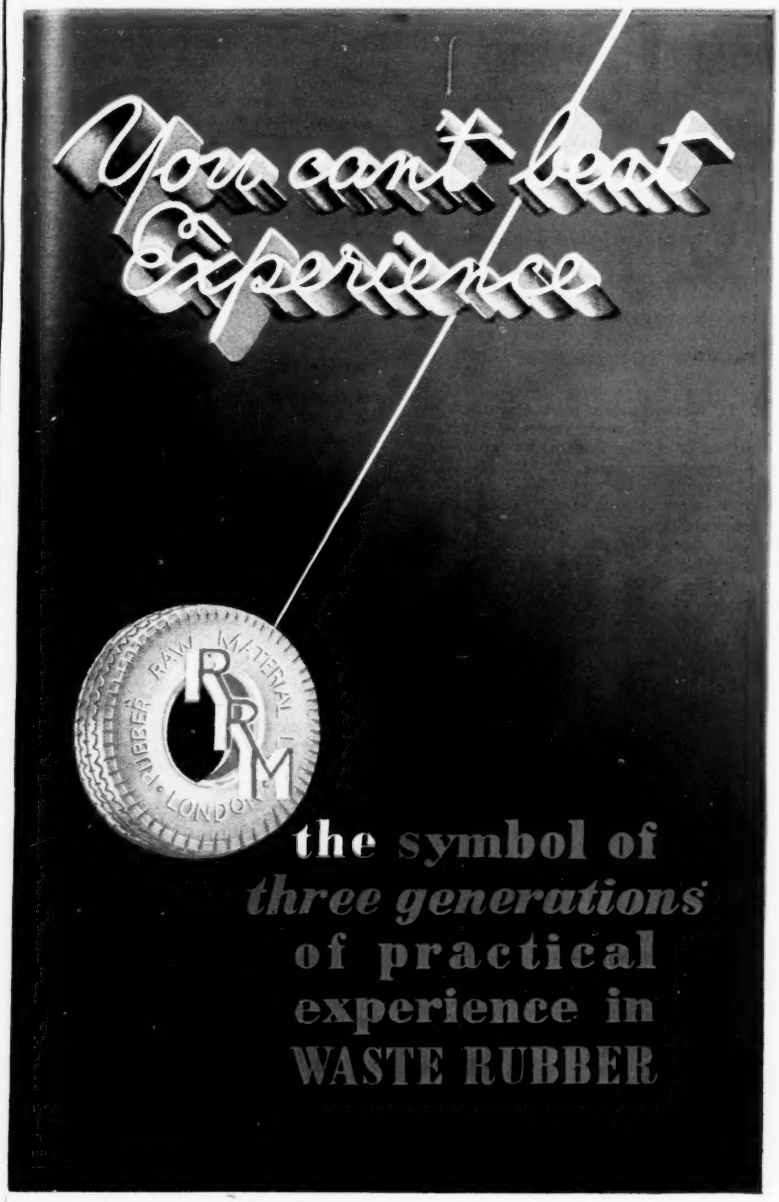
Irving N. Simmons has been appointed head of the patent division of Houdry Process Corp., 225 S. 15th St., Philadelphia 2, Pa. He has been with the firm since its founding in 1931 and, as patent chief, will be responsible for development and maintenance of corporation patents.

Richard E. Chaddock has been named manager of the sales research division of Hercules Powder Co., Wilmington, Del., succeeding Carl W. Eurenius, now director of sales of the cellulose products department. Dr. Chaddock joined Hercules in September, 1945, as a technical assistant in the research department and recently served as liaison between the department's sales development section and the company's sales research division.

Charles M. Baldwin, Chicago district manager of United Carbon Co., has also been made Midwest repre entative of The Meyer & Brown Corp., 347 Madison Ave., New York 17, N. Y. Mr. Baldwin makes his headquarters at 135 S. LaSalle St., Chicago 3, Ill.

S. Kauffman, after six years as chief chemist with Canadian General Tower, Ltd., Galt, Ont., has formed his own company, Kayson Rubber & Plastics, Ltd., 144 Water St. S., Galt. The new company began production on October 15 and is now operating on a 24-hour schedule. The plant comprises 20,000 square feet of floor space and is equipped with rubber mills and plastics grinding machines suitable for special work in rubber and plastics compounding. The company is currently employed with reclaiming and specially coloring polystyrene, methyl methacrylate, cellulose acetate, and other thermoplastics. The plant has a capacity of more than 10,000 pounds of recolored polystyrene per day and is said to be the only plant in Canada where plastics molders can send material to be reclaimed and from which they can obtain special colors with quick delivery.

J. Boyd Cook, chief chemist, Wooster Rubber Co., Wooster, O., and 1948 chairman of the Wooster Section, A. C. S., is heard in a radio program, "Headlines in Chemistry," every Tuesday at 5:45 p.m. over station WWST.



Greetings
and
Best Wishes

to all Friends who have placed confidence in us during 1948 and with the hope that we continue to serve in a coming year of Good Fortune and Prosperity

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C. C. Thackray, president of Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, said that in few, if any, industries which are not under government control have selling prices been maintained at a lower level than in the rubber industry. Speaking before 200 company employes at the company's annual Quarter Century Club gathering on December 3, Mr. Thackray pointed out that a tire sells today for less than it did in 1939. In addition, 25 years ago a tire of comparable size which did not give a quarter of the wearing qualities of a casing made today sold for more than the present-day price. Rubber boots also sold for more in 1913 than they now cost despite the enormous increase in the cost of doing business. During the evening six employes from the Montreal plant who have been with Dominion Rubber for more than 40 years were presented with engraved gold watches by Mr. Thackray, and each was granted a special leave of absence with pay for one month besides the regular vacation. These employes were Joseph Gravel, Medalger Alarie, Leo Paul Aubertin, Judes A. Vezina, A. C. McGiverin, and W. G. Manchester.

I. Leo Cantwell recently joined Lowell Insulated Wire Co., Lowell, Mass., as factory manager. Mr. Cantwell spent 24 years at the Bristol, R. I., factory of United States Rubber Co.

Marvin Achterhoff, chief chemist at Ohio Rubber Co., Willoughby, O., has been named alternate representative to the board of governors of the Cleveland Technical Society by the Painesville Section, A. C. S.

Harold F. Smiddy has been elected a vice president of General Electric Co., Schenectady, N. Y. Mr. Smiddy, who came to the company in March, 1948, on the president's staff, remains as general manager of G-E's air conditioning and chemical departments.

Ben F. Michtom, of Ideal Novelty & Toy Co. and Ideal Rubber Co., Inc., 273 Van Sinderen Ave., Brooklyn 7, N. Y., last month was elected treasurer of the Toy Manufacturers of the U. S. A.

J. V. Bassett, chief sales engineer, heavy-duty friction material division, has been transferred from the Passaic, N. J., office to the equipment sales division equipment headquarters of Raybestos-Manhattan, Inc., in the Fisher Bldg., Detroit, Mich., in a move to place him nearer the heart of the automotive and equipment industry. Mr. Bassett has been with the Manhattan Rubber Division of the company a quarter-century.

LaVerne E. Cheyney, with Battelle Memorial Institute, Columbus, O., for several years, left recently to accept a position with Waterproof Ohio Paper Co., Middletown, O.

Arthur H. Styron has been named manager of the automotive replacement division of Thermoid Co., Trenton, N. J., to succeed Fred Beecher, who retired after 25 years with the company. Mr. Styron, who joined Thermoid, 21 years ago, served most recently as southern division manager.

Seldon T. Williams, vice president of Scovill Mfg. Co., Inc., has been appointed general manager of A. Schrader's Son Division, 470 Vanderbilt Ave., Brooklyn 17, N. Y. Mr. Williams joined Schrader in 1929 and in 1944 was appointed vice president of Scovill, in charge of manufacturing of Schrader domestic and foreign plants.

E. V. Crane has joined The Hydraulic Press Mfg. Co., Mt. Gilead, O., as chief engineer. He previously had been employed by General Electric Co., Crooke Works, Die Casting Division of National Lead Co., E. W. Bliss Co., and Sam Tour & Co., Inc.

E. L. Carlotta has been appointed research and development engineer for rubber products of The Parker Appliance Co., Euclid Ave., Cleveland 12, O. Mr. Carlotta joined Parker in 1941 as rubber research chemist and in 1945 was named superintendent of rubber production of the Parker special products division which covers the company's activities in rubber and plastics. The present appointment reflects the growing importance of Parker production of precision rubber molded parts for industrial and aircraft use.

OBITUARY

Eldon M. Eckhart

ELDON M. ECKHART, executive vice president of J. M. Huber Corp., 342 Madison Ave., New York 17, N. Y., producers of carbon black, printing inks, oil and gas, and kaolin clay, died suddenly November 28 at his home in Amarillo, Tex. He was in charge of Huber's carbon black and oil and gas operations with headquarters at Borger, Tex.

Mr. Eckhart was born in 1896 near Peoria, Ill. After attending Illinois State Normal College, he became a teacher for the government in the Philippines. When the United States entered World War I, he appealed directly to the White House for a release from his teaching contract so that he could join the Armed Forces. When the release came, he entered the Air Corps.

After the war Mr. Eckhart settled in Louisiana, and in 1926 joined Huber as superintendent of its Breckenridge, Tex., carbon black plant. Later he was transferred to Swartz, La., as superintendent of its plant there. In 1936 he went to Borger as assistant to the general manager; in 1938 he became vice president in charge of the Borger operation and in 1940 he was named executive vice president of the company.

Eldon M. Eckhart

George F. Johnson

GEORGE FRANCIS JOHNSON, chairman of the board of Endicott-Johnson Corp., Endicott, N. Y., died at his home in that city on November 28, following a seven-week illness.

He was born in Milford, Mass., October 14, 1857, the son of a shoemaker, which trade the boy also took up. In 1894 he became the partner of Henry B. Endicott into whose hands had passed the bankrupt Lester Brothers shoe company, where Mr. Johnson was employed. In 1920, upon the death of Mr. Endicott, Mr. Johnson became president of the company. He served for many years in this position before becoming chairman of the board of directors.

The deceased was also widely known for his philanthropies.

He is survived by two sons, two daughters, a brother, ten grandchildren, and nine great-grandchildren.

Vere H. Dingmon

VERE H. DINGMON, a past president of the Xylos Rubber Co., who retired two years ago, died December 10 in an Akron, O., hospital following a long illness. Funeral services were held at the Billow Chapel, Akron, on December 14, followed by burial at Rose Hill Burial Park.

Born in Portland, Ore., on December 15, 1890, Mr. Dingmon was two years old when his family moved to Coldwater, Mich., where he attended elementary and high school and the Ferris Institute, Big Rapids, Mich., from which he was graduated in June, 1909. Then he became an accountant for Fairbanks, Morse & Co., Chicago, Ill.; auditor and assistant manager of the Detroit Electric Car Co., (1914); and auditor and logging supervisor of Warren-Lamb Lumber Co., Rapid City, S. Dak., (1919).

Mr. Dingmon's association with the rubber industry began in 1925 when he joined the auditing staff of the Firestone Tire & Rubber Co., Akron. In 1927 he was appointed vice president and general manager of the Xylos Rubber Co., a subsidiary of Firestone, and remained in that position until 1932 when he became president of Xylos.

In 1943 Mr. Dingmon was appointed a member of the War Production Board as a "dollar-a-year man" and became deputy administrator in charge of the scrap and reclaim division. He was also very active in the Rubber Reclaimers Association, having served as its president from 1936 to 1938 and on the board of directors. He was also a member of the Church of Our Saviour, the Portage Country Club, and the Elks.

Surviving are his wife, a brother, and a sister.

significant data

on the use

of

BxDC*

(BUTOXYETHYL DIGLYCOL CARBONATE)

as a

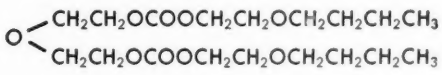
plasticizer

This new material has excellent properties as a plasticizer in typical vinyl resins and as a low temperature plasticizer for butadiene-acrylonitrile copolymers. It is also useful as a lubricant in Butyl rubber stocks compounded with the Columbia pigment Silene EF, or other non-carbon pigments. In this case, the addition of one to three parts BxDC per 100 of Butyl rubber appears to overcome the tendency of these stocks to adhere tightly to mixing or sheeting mills at processing temperatures in factory practice.

SEND FOR FREE BULLETIN—Properties of BxDC and data assembled on the performance of this plasticizer in a variety of applications are furnished in a newly published bulletin. Just write, requesting Columbia Plasticizer Data Sheet No. 48-2.

***GENERAL CHARACTERISTICS OF BxDC**

[Diethylene Glycol Bis (2-n-Butoxyethyl Carbonate)]



Butoxyethyl Diglycol Carbonate is a new, colorless, liquid organic plasticizer. It is substantially insoluble in water and is very stable to hydrolysis by water. Only neutral products and carbon dioxide can be formed upon hydrolysis. It is soluble in a wide range of organic solvents and is further characterized by excellent resin compatibility, low volatility and high plasticizing efficiency.

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Paul C. Jones

THE former president of Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, Paul C. Jones, died November 27 at his home in Richmond, Va., where he resided since his retirement as president. At the time of his death he was a director of the company.

Born in Franklin City, Va., in 1896, Mr. Jones came to Canada in 1936. That year he was appointed chairman of the board of Terminal Warehouses, Ltd., Toronto. Prior to that he had spent several years employed in Cuba and Chile. In 1939 he left Terminal to become president of Dominion Rubber, a subsidiary of United States Rubber Co., New York, N. Y., though he continued to serve as a director of the Terminal company. He was president of Dominion until January, 1946, when he became vice chairman of its board, a position he retained until April, 1948.

A past president and director of the Rubber Association of Canada, the deceased also had been president of Canadian Lastex Co., Ltd.; and of Dominion Rubber Munitions, Ltd.; vice president and a director of Irwin Dyestuffs Corp.; and a director of Baymond Corp. and of Canadian Synthetic Rubber, Ltd.

Mr. Jones had been a member of the St. James, Royal Montreal Golf, Seigniory, the Lambton Golf & Country, and the Royal Canadian Yacht Clubs.

Surviving are the widow and two sons.

Robert T. Kain

ROBERT T. KAIN, manager of the Dallas district of the industrial products sales division, The B. F. Goodrich Co., died suddenly of a heart attack in the Texas city, December 2.

Born in Philadelphia, Pa., on January 24, 1900, Mr. Kain entered the U. S. Navy after graduating from high school in 1917, was later sent to the U. S. Naval Academy at Annapolis from which he was graduated, and left the Navy in 1926.

Joining Goodrich in Philadelphia in 1927 as a sales clerk in the industrial products district offices, the deceased went to Akron, O., as a belting engineer in 1932 and remained in that capacity until he reentered naval service 10 years later. Returning after the late war, Mr. Kain was made manager of the San Francisco district of the industrial products sales division in November, 1945, and remained there until January, 1948, when he was sent to Dallas.

Surviving are the widow and two sons.

FINANCIAL

Raybestos-Manhattan, Inc., Passaic, N. J. First three quarters, 1948: net profit, $1,480,350, equal to $2.36 each on 628,100 capital shares, against $1,502,914, or $2.39 a share, in the like period of 1947.

Union Asbestos & Rubber Co., Chicago, Ill. First nine months, 1948: net income $1,040,386 equal to $2.10 a share, contrasted with $738,119, or $1.49 a share, a year earlier; sales, $9,402,073 (a record high), against $6,222,960.

United Carbon Co., Charleston, W. Va., and subsidiaries. Nine months ended September 30: net profit, $2,284,773, equal to $2.87 each on 795,770 capital shares, against $2,317,646, or $2.91 a share, in the 1947 months; state and federal tax provision, $1,414,000, against $1,501,000; reserve for depreciation and depletion, $2,679,433, against $2,196,814.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. Nine months ended September 30: net profit, $928,822, equal to $3.11 each on 298,898 capital shares, compared with $860,813, or $2.88 each on 298,858 shares, a year earlier; net sales, $14,354,070, against $14,378,974; federal income tax, etc., $638,347, against $629,734.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Com.	$0.25	Dec. 29	Dec. 17
	7% Pfd.	1.75 q.	Dec. 29	Dec. 17
American Wringer Co., Inc.	Com.	0.15 extra	Dec. 28	Dec. 14
	Com.	0.30 q.	Jan. 3	Dec. 14
Anaconda Wire & Cable Co.	Com.	2.00 yr. end	Dec. 21	Dec. 10
Armstrong Rubber Co.	"A&B"	0.25 q.	Jan. 3	Dec. 16
	Pfd.	0.59⅜ q.	Jan. 3	Dec. 16
Belden Mfg. Co.	Com.	0.30	Jan. 15	Dec. 22
Borg-Warner Corp.	Com.	1.50 extra	Jan. 3	Dec. 17
	Com.	1.00 q.	Jan. 3	Dec. 17
Canada Wire & Cable Co., Ltd.	3½% Cum. Pfd.	0.87½ q.	Jan. 3	Dec. 17
	"B"	0.75 interim	Dec. 15	Nov. 30
	"A"	1.00	Dec. 15	Nov. 30
Crown Cork International	"A"	0.25	Jan. 3	Dec. 20
Crown Cork & Seal Co., Inc.	Com.	0.25 yr. end	Jan. 17	Dec. 31
Denman Tire & Rubber Co.	Com.	0.05 q. red.	Jan. 2	Dec. 20
Dewey & Almy Chemical Co.	Com.	0.35 q.	Dec. 20	Dec. 3
Dunlop Tire & Rubber Goods Co., Ltd.	Com.	1.25	Dec. 20	Dec. 15
Electric Hose & Rubber Co.	Com.	0.30 q.	Nov. 26	Nov. 19
Endicott Johnson Corp.	Com.	0.40 q.	Jan. 1	Dec. 23
	4% Pfd.	1.00 q.	Jan. 1	Dec. 23
	Com.	0.40 extra	Jan. 1	Dec. 23
Faultless Rubber Co.	Com.	0.50 irr.	Jan. 3	Dec. 15
Firestone Tire & Rubber Co.	Com.	1.00	Jan. 20	Jan. 5
General Tire & Rubber Co.	4¼% Pfd.	1.06¼ q.	Dec. 31	Dec. 21
	3¾% Pfd.	0.93¾ q.	Dec. 31	Dec. 21
	3¼% Pfd.	0.81¼ q.	Dec. 31	Dec. 21
Jenkins Bros.	Com.	1.50	Dec. 29	Dec. 17
	W. V.	0.37½	Dec. 29	Dec. 17
	Pfd.	1.75	Dec. 29	Dec. 17
Link Belt Co.	Com.	1.00 q.	Mar. 1	Feb. 1
	Com.	1.00 extra	Jan. 7	Dec. 18
Mansfield Tire & Rubber Co.	Com.	0.50 extra	Dec. 20	Dec. 10
	Com.	0.25 q.	Dec. 20	Dec. 10
	Pfd.	0.30 q.	Jan. 2	Dec. 15
Pharis Tire & Rubber Co.		Liquidating*	Jan. 10	Dec. 27
Rome Cable Corp.	Com.	0.15 q.	Dec. 27	Dec. 7
	Pfd.	0.30 q.	Jan. 3	Dec. 7
Seiberling Rubber Co.	Com.	0.25 resumed	Dec. 29	Dec. 6
	Pr. Pfd.	1.12½ q.	Jan. 2	Dec. 15
	Pfd. "A"	1.25 q.	Jan. 2	Dec. 15

*One share Carlisle Corp. for each 2 Pharis shares.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, and Inventory, October—September, 1948; First 10 Months, 1948-1947

	1948				1947
	October	% of Change from Preceding Month	September	First 10 Months	First 10 Months
Passenger Casings					
Shipments					
Original equipment	2,043,467		1,718,022	17,739,264	16,013,154
Repacement	3,175,434		3,770,876	36,417,565	44,927,677
Export	56,604		41,950	536,878	1,410,489
Total	5,275,505	−4.62	5,530,848	54,693,647	62,351,320
Production	5,560,088	−3.14	5,740,418	58,190,189	64,788,542
Inventory end of month	8,002,433	+1.97	7,848,143	8,002,433	4,108,786
Truck and Bus Casings					
Shipments					
Original equipment	392,716		396,154	4,466,496	4,607,602
Replacement	723,868		689,328	6,617,424	8,304,101
Export	99,437		84,006	962,804	1,415,085
Total	1,216,021	+3.98	1,169,488	12,046,724	14,326,788
Production	1,190,212	+1.37	1,174,108	12,364,440	14,995,518
Inventory end of month	1,902,830	−2.77	1,957,080	1,902,830	1,404,589
Total Automotive Casings					
Shipments					
Original equipment	2,436,183		2,114,176	22,205,700	20,620,756
Replacement	3,899,302		4,460,204	43,034,989	53,231,778
Export	156,041		125,956	1,499,682	2,825,574
Total	6,491,526	−3.12	6,700,336	66,740,371	76,678,108
Production	6,750,300	−2.38	6,914,526	69,554,629	79,784,060
Inventory end of month	9,905,263	+1.02	9,805,223	9,905,263	6,513,375
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,432,152		2,112,164	22,204,763	20,618,993
Replacement	3,537,048		4,006,637	35,491,817	39,711,943
Export	91,316		81,243	915,016	2,239,620
Total	6,060,516	−2.25	6,200,044	58,611,596	62,570,556
Production	6,323,006	+2.12	6,191,462	59,652,510	66,178,833
Inventory end of month	8,915,443	+1.56	8,778,449	8,915,443	6,427,386

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers' Association, Inc., 444 Madison Ave., New York 22, N. Y.

TALES WORTH RETELLING

(No. 11 of a series)

When GEORGE WESTINGHOUSE tried to explain his new invention, the air brake, to Commodore Vanderbilt, the Commodore scorned him.

"Do you expect to stop a train with wind?" he asked. "I have no time to spend with fools."

Undaunted, Westinghouse went to work to overcome this belligerent resistance. He invented an improved railroad frog, a switch part, which appealed to the railroad officials so much that they permitted him to have his air brake tested. Today Westinghouse's air brake is universally used to make travel safer.

In business, perseverance is a criterion for success.

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Patents and Trade Marks

APPLICATION

United States

2,452,643. **Disposable Venoclysis Set.** M. R. Fields, Chicago, assignor to Abbott Laboratories, North Chicago, both in Ill.

2,452,644. **Apparatus for Intravenous Administration of Liquids.** M. R. Fields, Chicago, assignor to Abbott Laboratories, North Chicago, both in Ill.

2,452,714. **Piston.** H. Barnard, Houston, Tex., assignor to Whitehead Bros. Rubber Co., a corporation of N. J.

2,452,722. **Clinical Mask for Breathing and Rebreathing Mixtures of Gases.** W. M. Boothby and A. H. Bulbulian, both of Rochester, Minn., and W. R. Lovelace, II, Albuquerque, N. Mex.

2,452,783. **Shockproof Aerial-Delivery Contrivance Launchable from an Airplane and Including a Supplies Container and a Collapsible and Inflatable Bag of Flexible, Elastic Material.** R. J. Nebesar, assignor to Universal Moulded Products Corp., both of Bristol, Pa.

2,452,883. **Anti-Splash Heel.** C. O. Walper, Kitchener, Ont., Canada.

2,452,889. **Flexible Coupling.** J. N. Wolfram, assignor to Parker Appliance Co., both of Cleveland, O.

2,452,902. **Safety Inner Tube for Pneumatic Tires.** B. Carlin, Orange, assignor of 49% to W. O. Haizlip and R. B. Cammack, both of Nederland, and J. Ener, Jr., and L. De Cordova, both of Beaumont, all in Tex.

2,452,973. **Bilge Water Pumping Apparatus Including a Plurality of Expansible and Compressible Pump Bulbs.** C. I. Weir, Buffalo, N. Y.

2,452,997. **Rectal Spray Depurator.** W. J. Coward, Lakeland, Fla.

2,452,998. **Pneumatic Tire.** G. R. Cuthbertson, Detroit, Mich., assignor to United States Rubber Co., New York, N. Y.

2,453,002. **Footwear Having a Raised Shank and a Heel Adapted to Discharge Water from Its Surface against the Shank.** A. J. Dunbrook, Kitchener, Ont., Canada, assignor to B. F. Goodrich Co., New York, N. Y.

2,453,143. **Tennis Ball.** L. S. M. Lejeune, Paris, France; vested in the Attorney General of the United States.

2,453,149. **Inflatable Members in a Buoyant Attachment for Standard Tanks.** A. J. McCutchen, Washington, D. C.

2,453,166. **In a Truss, a Pad of Sponge Rubber, a Rigid Backing for the Pad, and a Resilient Cover for the Backing.** J. G. Towns, Grand Junction, Colo.

2,453,209. **Drive for Track-Laying Vehicles.** H. V. Dwight, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,453,331. **In a Pipe Connection for a Tank Having a Corrosion Resistant Lining, an Annular Keying Recess and a Body of Thermoplastic Corrosion-Resistant Material Filling the Recess.** W. H. Martin, Lakewood, O., assignor, by mesne assignments, to Republic Industries, Inc., New York, N. Y.

2,453,343. **Thermoplastic Retainer Strip in a Window Structure.** M. J. Reilly, Baltimore, assignor to Glenn L. Martin Co., Middle River, both in Md.

2,453,364. **Protecting Attachment for a Hairdrier Including an Annulus Formed of a Single Thickness of a Thin Flexible Waterproof Material Provided with Means for Attaching One End to a Drier and the Other to the Head of the Person Whose Head Is to Be Dried.** M. S. Fears, Norfolk, Va., assignor to A. H. Grabb, Monticello, Ill.

2,453,372. **Lady's Undergarment with a Liner of Impervious Sheet Material.** M. K. Janin, Port Credit, Ont., Canada.

2,453,418 and 2,453,420. **Water-Buoyant Insulated Electric Power Cable.** P. Dunsheath, Abinger, and W. C. Barry, Gravesend, assignors to W. T. Henley's Telegraph Works Co., Ltd., Westcott, both in England.

2,453,368. **Spring Steel Tire Shoe with Rubber Sole.** W. J. Sprong, Alhambra, Calif.

2,453,700. **Life Jacket.** R. E. Coombs and R. C. Hale, both with U. S. Coast Guard.

2,453,834. **Combination Corset and Stocking Retainer Made of a Molded Plastic Material and Adapted to Form a Close Fit on the Wearer's Thigh.** L. M. Deegan, Melbourne, Victoria, Australia.

2,453,906. **Device to Preserve Plants, Including a Tubular Container of Waterproof, Material, Bored Stoppers at Both Ends, and an Elastic Diaphragm.** D. P. Hamlet, assignor to C. Bussert, both of Melrose Park, Ill.

2,453,997. **Rubber Mounting.** G. H. Kaemmerlins, assignor to Lord Mfg. Co., both of Erie, Pa.

2,454,036. **Fluid Seal for Shafts, Including an Annular Ring of Rubber Provided with an Annular Groove in Which a Series of Independent Springs Is Arranged.** H. Clayton-Wright, Stratford-on-Avon, England, assignor to S. C. Leonard, Detroit, Mich.

2,454,100. **Battery Plate Separator, Including a Pair of Fibrous Glass Mats Spaced Apart by Rods of Synthetic Resin.** G. Slayter, Newark, O., assignor to Owens-Corning Fiberglas Corp., a corporation of Del.

2,454,218. **Composite Insulating Member of Woven Asbestos Fibers Impregnated and Bonded with a Resin.** E. L. Schulman, Wilkinsburg, assignor to Westinghouse Electric Corp., East Pittsburgh, both in Pa.

2,454,242. **Horn Button Construction Including a Unitary Actuating Member of Resilient Rubber-Like Material.** J. J. Wharam, Dearborn, and M. Jovanovich, Detroit, assignors to Ford Motor Co., Dearborn, both in Mich.

2,454,391. **In a Method of Producing Printed Fabrics, the Use of a Wet Paste Containing a Polymerizable Melamine Formaldehyde Resin Resist.** A. S. Jones, Dudley, and G. B. Stackpole, Oxford, both in Mass., assignors to Cranston Print Works Co., Cranston, R. I.

2,454,399. **Eraser.** C. F. Norlin, Chicago, Ill.

2,454,507. **Athletic Supporter of Elastic Knitted Webbing Including Rubber Strands.** C. J. Flaherty, New York, N. Y.

2,454,529. **Rear Grip for Fishing Rod Handles Including Molded Plastic Tubular Members.** R. A. Thompson and E. E. Eriksson, both of Detroit, and J. Carlson, Grosse Pointe Farms, both in Mich.; Eriksson and Thompson assignors to Orchard Industries, Inc., Detroit, Mich., and J. Carlson, assignor, by decree of court, to M. E. H. W. Carlson.

2,454,567. **Radio Shielding Sealing Gasket.** A. A. Pierson, Jr., Cooperstown, N. Y.

2,454,606. **Ventilated Corset with Side Panels of Thin Elastic Open-Weave Fabric.** J. J. Kispert, Mount Carmel, Conn.

2,454,707. **Mounting for Spinning Rings, Etc., Including a Grommet of Resilient Material.** G. L. Meyers, Willoughby, and J. C. Shutt, Wickliffe, assignors to Ohio Rubber Co., Willoughby, both in O.

2,454,750. **Vehicle Tire.** E. C. Woods, Gravesend, assignor to Henley's Tire & Rubber Co., Dorking, both in England.

United Kingdom

609,776. **Elbow Connection for Pipe Lines.** Dunlop Rubber Co., Ltd., and C. G. Bulmer.

609,795. **Moldings from Highly Polymeric Linear Esters.** Imperial Chemical Industries Ltd., J. S. Byers, J. C. Swallow, and J. M. Walter.

609,851. **Gasket.** Bendix Aviation Corp.

609,928. **Elastic Supports.** Rubber Bonders, Ltd., and R. Boole.

610,022. **Rubber or Other Flexible Structure.** J. L. Reynolds.

610,116. **Bearing of Rubber or Similar Resilient Material.** Dunlop Rubber Co., Ltd., and R. L. Dunn.

610,743. **Flexible Hose.** P. K. Saunders.

610,955. **Resilient Bearings.** Silentbloc, Ltd. and P. C. Hutton.

610-956-959. **Resilient Mountings.** L. F. Thiry.

611,028. **Inflatable Core for Molding Perforations in Concrete, Mortar, Pottery, Etc.** A. Semeraro.

PROCESS

United States

2,452,557. **Protecting a Tube from Corrosion and Erosion by Spray-Coating with Rubber-Like Material.** S. A. Eller, New York.

2,452,577. **Producing a Dry Rectifier Element Having a Layer of Thermoplastic Semi-Conducting Material.** C. A. Kotterman, Livingston, N. J., assignor to Federal Telephone & Radio Corp., New York, N. Y.

2,452,607. **Plastic Sheathed Articles.** C. E. Slaughter, New Canaan, assignor to Extruded Plastics, Inc., Norwalk, both in Conn.

2,452,752. **Elastic Chains.** W. Hartranft, Palmyra, N. Y., assignor to Elastic Chain Co., Bratenahl, O.

2,452,761. **Forming Rectangular Slabs of Organic Plastic Material.** R. S. Jesionowski, assignor to Plax Corp., both of Hartford, Conn.

2,453,186. **Hot-Water Treatment of Vinyl Resin Light-Polarizing Sheet.** F. J. Binda, assignor to Polaroid Corp., both of Cambridge, Mass.

2,453,604. **Making Prosthetic Articles Utilizing a Reversible Rubber Mold.** A. and M. Tenenbaum, both of Jamaica, N. Y.

2,453,984. **Twisted Thread from a Ribbon of a Heat-Sealable and Heat-Stretchable Film Material.** C. E. Gardner, Hollis, N. Y., assignor to Wingfoot Corp., Akron, O.

2,453,625. **Insulating an Electrical Conductor with Laminated Polytetrafluoroethylene.** L. A. Bondon, Arlington, N. J.

Dominion of Canada

452,324. **Flexible, Hard Surfaced Unitary Composite Resinous Panel.** W. R. Hoover, Wilmington, Del., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

452,423. **Progressively Stretching Laterally a Continuous Sheet of Rubber Hydrochloride Film.** F. J. Young, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

452,526. **Curing a Pneumatic Tire.** T. A. TeGrotenhuis, Olmsted Falls, assignor to General Tire & Rubber Co., Akron, both in O., U.S.A.

452,655. **Forming a V-Belt.** A. L. Freedlander, assignor to Dayton Rubber Co., both of Dayton, O., U.S.A.

CHEMICAL

United States

2,452,554. **Production of Acrylonitrile by Heating Ethylene Cyanohydrin in the Presence of a Residue Resulting from the Heat Treatment of the Ethylene Cyanohydrin.** H. S. Davis, Riverside, and E. L. Carpenter, Old Greenwich, both in Conn., assignors to American Cyanamid Co., New York, N. Y.

2,452,602. **Aliphatic Polyamines.** C. N. Robinson, Jr., Trenton, and J. F. Olin, Grosse Ile, both in Mich., assignors to Sharples Chemicals Inc., Philadelphia, Pa.

2,452,669. **Acceleration of the Copolymerization of a Polyester and a Vinyl Compound by Copolymerizing in the Presence of an Organic Peroxide and Triethanolamine, Triisopropanolamine, or Methyl Diethanolamine.** M. M. Levine, Rochester, assignor, by mesne assignments, to Cornell Aeronautical Laboratory, Inc., Buffalo, both in N. Y.

2,452,672. **Alpha-Beta Unsaturated Acids and Their Nitriles and Esters.** S. A. Miller and W. H. Groombridge, both of Spondon, Derby, England, assignors, by mesne assignments, to Celanese Corp. of America, a corporation of Del.

2,452,700. **Acetone-Soluble Copolymer of 2,5-Dimethyl-1,5-Hexadiene and a Monomeric Acrylic Ester Obtained by Heating together in the Presence of a Peroxy Compound.** P. O. Tawney, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,452,791. **Fluorohydracrylic Acids and Their Esters,** M. S. Raasch, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,452,876. **Oil-Soluble Resin of Low Acid Number from Rosin and a Copolymer of Vinyl Acetate with an Alpha-Unsaturated Carboxylic Acid Ester Containing More Than 5 Carbon Atoms.** J. B. Rust, West Orange, and W. B. Canfield, Montclair, both in N. J., assignors, by direct and mesne assignments, of one-half to Montclair Research Corp., and one-half to Ellis-Foster Co., both corporations of N. J.

2,452,959. **Linear Silmethylenesiloxane.** B. A. Bluestein, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,452,992. **Coating Composition, Including Fatty Drying Oils Reacted with Fatty Acid Modified Polyhydric Alcohol Esters of Cyclopentadiene Maleic Adduct.** W. H. Butler, Bloomfield, N. J., assignor to Bakelite Corp., a corporation of N. J.

2,452,999. **Cellular, Hard, Tough, Slightly Elastic Thermoplastic Receptacle from a Mix Including Rubber, and a Resin from the Class of Hard Thermoplastic Resin of Cyclized Rubbers, Hard Thermoplastic Resinous Polymerization Product of Butadiene-1,3-Styrene, Hard Thermoplastic Resinous Polymerization Product of Butadiene-1,3 with Acrylonitrile, a Vulcanizing Agent and Chemical Blowing Agent.** L. E. Daly, Osceola, and J. F. Schott, Mishawaka, both in Ind., assignors to United States Rubber Co., N. Y.

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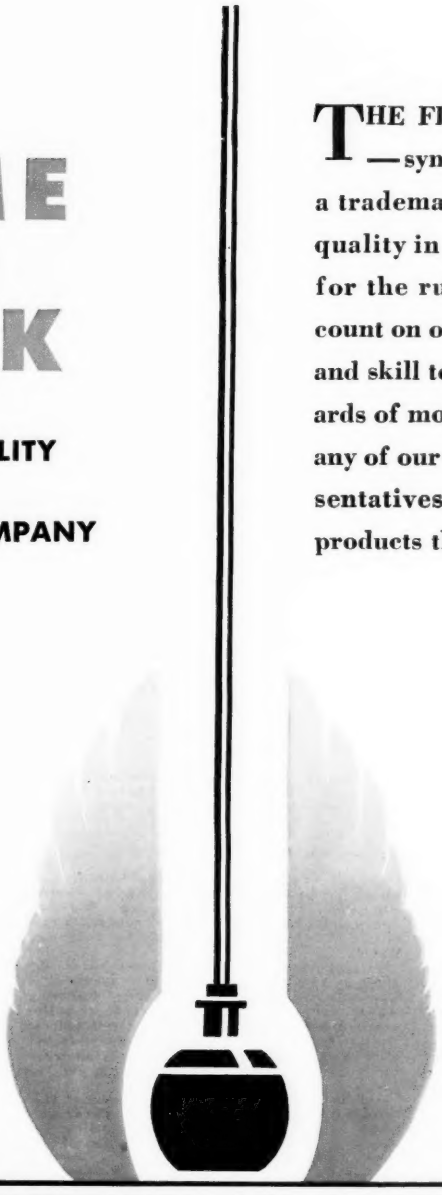

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2,453,059. **A Sulfur-Dioxide-Olefin Resin in the Form of a Finely Divided Powder Suitable for Molding Mechanical Grinding.** A. K. Scribner and F. W. Wilder, both of Portsmouth, Va., assignors, by mesne assignments, to Phillips Petroleum Co., a corporation of Del.

2,453,044. **Cyclopentadiene and Its Homologs.** C. E. Staff, Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,452,952. **A Supple Stratified Film Including a Layer of Polyvinyl Chloride Resin Plasticized with Chlorinated Paraffin and a Layer of Polyvinyl Chloride Resin Plasticized with Polypropylene Glycol Sebacate.** H. A. Van Etten, Newburgh, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,453,670-671. **Desensitization of Solid Organic Peroxides.** H. C. Hyatt, Buffalo, and E. S. Shanley, Kenmore, assignors to Buffalo Electro-Chemical Co., Inc., Tonawanda, all in N. Y.

2,453,085. **Production of Synthetic Resins by Reacting Thiophene with an Aldehyde in the Presence of Sulfuric Acid and Water.** P. D. Caesar, Champaign, Ill., and A. N. Cochaves, Woodbury, N. J., assignors to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,453,086. **Synthetic Resins Prepared by Reacting an Alkyl Thiophene with an Aldehyde in the Presence of Sulfuric Acid and Water.** P. D. Caesar, Champaign, Ill., assignor to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,453,092. **Polymerizing Cyclic Diorganosiloxane to Higher Molecular Weight Polymer by Heating with an Alkali Metal Salt of a Triorgano Stanol.** J. F. Hyde and O. K. Johannson, assignors to Corning Glass Works, all of Corning, N. Y.

2,453,097. **Solution Which on Being Cast Yields Foils and Films of Improved Stripping Properties, and Consisting of a Polymeric N-Vinyl Pyrrole Compound in Chloroform.** A. C. Cornik, Binghamton, assignor to General Aniline & Film Corp., New York, both in N. Y.

2,453,150. **Polyesters of Dimethylene D-Gluconic Acid.** C. L. Mehltretter, Peoria, Ill., assignor to the United States of America, as represented by the Secretary of Agriculture.

2,453,167. **Copolymer of Vinyl Acetate and a Member of the Class of Diallyl and Dimethallyl Arylphosphonates.** A. D. F. Toy, Chicago, Ill., assignor to Victor Chemical Works, a corporation of Ill.

2,452,168. **Copolymer of Methyl Methacrylate and a Member of the Class of Diallyl and Dimethallyl Arylphosphonates.** A. D. F. Toy, Chicago, Ill., assignor to Victor Chemical Works, a corporation of Ill.

2,453,174. **Composition for Sealing and Potting Electrical Devices Consisting of Tri(p-Tertiary-Butyl Phenyl) Phosphate and Coumarone-Indene Resin.** H. E. Wright, Jr., Silver Spring, Md.

2,453,188. **Bonding Agent for Friction Elements, Which Is a Solution Formed by Intimately Mixing Finely Divided Sulfur and Partially Bodied Purely Heat-Polymerized Linseed Oil.** W. A. Blume, Farmington, and R. E. Spokes, Ann Arbor, both in Mich., assignors to American Brake Shoe Co., New York, N. Y.

2,453,214. **Thermoplastic Composition Including Ethyl Cellulose, Mineral Oil and a Resin.** H. G. Figdor, assignor to E. F. Houghton & Co., both of Philadelphia, Pa.

2,453,264. **Plastic Composition Consisting of a Cellulosic Plastic and Ethyl Alpha-Carbethoxyethoxy-Ethyl Carbonate, as Plasticizer.** C. E. Rehberg, Glenside, Pa., assignor to United States of America, as represented by the Secretary of Agriculture.

2,453,275. **As a New Article of Manufacture, Cellulose Butyrate-Crotonate Containing from 0.2 to 0.3 Crotonyl Groups per Glucose Residue.** G. W. Seymour, R. B. White, and E. Barabash, Cumberland, Md., assignors to Celanese Corp. of America, a corporation of Del.

2,453,288. **Synthetic Resins Produced by Reacting an Alkyl Benzene, a Phenolic Compound, and a Dihaloalkane in the Presence of a Friedel-Crafts Metal Halide Catalyst.** H. S. Bloch, assignor to Universal Oil Products Co., both of Chicago, Ill.

2,453,308. **Composition Including a Polyvinyl Butyraldehyde Acetal Resin, Dibutyl Sebacate, Ethyl Ether of Trimethylol Melamine, and Monoethyl Phosphoric Acid.** R. D. Dunlop, Longmeadow, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,453,317. **Resinous Copolymer from a Mixture of Vinyl Chloride and Isopropenyl Acetate Reacted in the Presence of a Peroxide Polymerization Catalyst.** R. L. Hasche, and E. M. McMahon, both of Kingsport, Tenn., assignors to Eastman Kodak Co., Rochester, N. Y.

2,453,471. **Preserving Caustic Soda from Contamination in Metal Containers by Applying to the Metal Surface a Priming Coat Including Corrosion Inhibiting Pigments Mixed with Chlorinated Rubber and a Phenolic Resin or Long Oil Alkyd Resin, and Then Applying a Mixture of Polystyrene and a Finely Divided Pigment Inert to Caustic.** J. L. Switzer and J. C. Michalek, both of Niagara Falls, N. Y., assignors to Mathieson Chemical Corp., a corporation of Va.

2,453,559. **Preparing Resinous Material by Heating a Mixture of Polylactylic Acids, Fatty Drying Oils, and Fumaric Acid, Maleic Anhydride or Mixtures of Fumaric Acid and Maleic Anhydride until Partially Polymerized, Then Adding an Oil-Soluble Hydrogenated Coumarone-Indene Resin.** P. D. Watson, Arlington, Va., assignor to the United States of America, as represented by the Secretary of Agriculture.

Dominion of Canada

452,117. **Treating the Fabric Surface of a Hose to Increase Its Abrasion Resistance, While Preserving Its Pliability and Inhibiting Mildew and Fungous Growths, by Passing the Hose through a Bath Containing Nitrocellulose, Bloom Oil Plasticizer, Fungicide, and, as Vehicle, Organic Nitrocellulose and Petroleum Plasticizer Solvents.** L. W. Schatz, South Tacoma, Wash., U.S.A.

452,145. **Plasticizing Vulcanized Rubber by Milling the Material under Oxidizing Conditions with Admixed Acid Material and Mercaptan at a Temperature below 180° F.** W. W. Evans, East Kingston, N. H., assignor to Boston Woven Hose & Rubber Co., Boston, Mass., both in the U.S.A.

452,156. **Plasticizing Vulcanized Rubber Scrap by Milling under Oxidizing Conditions with Admixed Acid Material and a Non-Accelerating Plasticizing Agent at below 180° F.** W. K. Evans, East Kingston, N. H., assignor to Boston Woven Hose & Rubber Co., Boston, Mass., both in the U.S.A.

452,255. **Urea-Formaldehyde Molding Composition.** L. Smedin, New York, N. Y., U.S.A.

452,319. **Creaming Synthetic Rubber Latex in the Presence of a Hydrophilic Colloidal Creaming Agent, a Soap of Abietic Acid, and a Material from the Group of Soaps of Aliphatic Acids Having Chains of 8 to 24 Carbon Atoms in the Molecule, Salts of the Sulfated and Sulfonated Esters of Such Aliphatic Acids.** J. S. Rumbold, Woodbridge, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

452,320. **Creaming Synthetic Rubber Latices in the Presence of a Hydrophilic Creaming Agent and a Strong Alkali.** J. S. Rumbold, Woodbridge, Conn., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

452,321. **Creaming of Synthetic Rubber Latices by First Reducing and Then Raising the pH of an Aqueous Emulsion Polymerizate and Then Creaming with a Hydrophilic Colloidal Creaming Agent.** E. C. Svendsen, Mishawaka, Ind., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

452,322. **Creaming with a Hydrophilic Colloidal Creaming Agent a Mixture of Several Emulsion Polymerizates Having Different Average Particle Sizes.** J. S. Rumbold, Woodbridge, Conn., U.S.A., assignor to Dominion Rubber Co., Montreal, P. Q.

452,330. **Stable Synthetic Resin Latex Including Vinyl Chloride, Methyl Acrylate, a Peroxygen Catalyst, an Alkaline Buffering Agent, and, as Emulsifier, N-Octadecyl Sulfosuccinamide Sodium Salt or N-Octadecyl N-(1,2-Dicarboxyethyl) Sulfonsuccinamide Sodium Salt.** G. W. Smith, Akron, O., assignor to R. F. Goodrich Co., New York, N. Y., U.S.A.

452,350. **Vinyl Aromatic Compounds Stabilized by the Presence of an Alkoxyhydroquinone.** E. R. Erickson, Niagara Falls, assignor to Mathieson Alkali Works, New York, both in N. Y., U.S.A.

452,416. **A Copolymer of a 2-Chlorallyl Ester of a Saturated Fatty Acid Containing not More Than Six Carbon Atoms, and Butadiene-1,3.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

452,417. **Preparation of Polymerized Materials from Acrylonitriles.** J. D. D'Ianni, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

452,418. **Emulsion Copolymer of Butadiene-1, 3 or Isoprene, and a Dialkyl Ester of Mono-Chloro-Maleic or Monochloro-Fumaric Acid.** A. M. Clifford, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

452,419. **Recovering Unreacted Monomers from a Latex of Rubber-Like Particles Produced by Emulsion Copolymerization of Butadiene and Styrene or Acrylonitrile.** J. B. Matchelson, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

452,422. **Preparing Synthetic Rubber Latex.** J. D. Wilkerson, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

452,475. **Thermoplastic Adhesive for Sealing the Joints of Containers of Fibrous Material Including Polymerized Vinyl Acetate Thoroughly Mixed with Pentaerythrityl-Abietate Resin.** J. E. Robinson, Glen Ellyn, Ill., assignor to American Can Co., New York, N. Y., both in the U.S.A.

452,476. **Thermoplastic Adhesive for Sealing Fiber Container Joints, Including Polymerized Vinyl Acetate Thoroughly Mixed with an Extracted Pine-Wood Pitch Resin.** J. E. Robinson, Glen Ellyn, Ill., assignor to American Can Co., New York, N. Y., both in the U.S.A.

452,511. **Polymerizing Styrene Monomer by Heating in the Presence of a Two-Component Catalyst Composition Including, as One Component, an Oxy-Compound of Boron and, as the Second, Oxalic Acid.** V. H. Turkington, Mountain Lakes, and L. R. Whiting, Woodbridge, both in N. J., U.S.A., assignors to Bakelite Corp., of Canada, Ltd., assignor to Carbide & Carbon Chemicals, Ltd., both of Toronto, Ont.

452,514. **Producing a Hydrophilic Surface on an Object Made from a Hydrophobic Polymer Containing Aromatic Nuclei.** H. P. Staudinger, Ewell, and H. M. Hutchinson, Banstead, both in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

452,517. **Solid Thermoplastic, Which Is a Terpolymer of a Monomeric Acrylic Ester, Monomeric Styrene, and a Monomeric Diallyl Phthalate.** P. O. Tawney, Passaic, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd., P.Q.

452,571. **Composition Including Natural or Synthetic Rubber and Hydrocarbon Resin.** F. J. Soday, Baton Rouge, La., assignor to United Gas Improvement Co., Philadelphia, Pa., both in the U.S.A.

452,640. **Dielectric Composition Including Dinaphthyl Sulfone and Chlorinated Diphenyl.** F. M. Clark, Pittsfield, Mass., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

452,641. **Dielectric Composition Including Chlorinated Diphenyl and Trichlor Alpha Nitronaphthalene.** F. M. Clark, Pittsfield, Mass., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

452,642. **Dielectric Composition Including Aromatic Sulfone and Hydrogenated Castor Oil.** F. M. Clark, Pittsfield, Mass., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

452,649. **Vinyl Resin Filaments, Fibers, and Yarns.** T. A. Feild, Jr., E. W. Ruggeby and J. L. Petrokubi, Charleston, W. Va., U.S.A., assignors to Carbide & Carbon Chemicals Ltd., Toronto, Ont.

United Kingdom

609,548. **Resins and Compositions Containing Them.** American Cyanamid Co.

609,609. **Preparation of Organo-siloxanes.** Corning Glass Works.

609,692. **Polystyrene.** Distillers Co., Ltd., H. [illegible]inson, and J. J. P. Staudinger.

609,693. **Plastic Compositons from Vinyl Chloride Copolymers.** Distillers Co., Ltd., C. A. Brighton, and J. J. P. Staudinger.

609,734. **Synthetic Resins.** E. Hene.

609,749. **Manufacture of Interpolymers of Polymerizable Liquid Esters with Drying Oils.** L. Berger & Sons, Ltd., and D. H. Hewitt.

609,750. **Manufacture of Interpolymers of Styrene with Polyhydric Alcoholic Mixed Esters and Coating Compositions Obtained therefrom.** Berger & Sons, Ltd., L. E. Wakeford, D. H. Hewitt, and F. Armitage.

609,790. **Cellulose Esters.** British Celanese, Ltd.

609,792. **Highly Polymeric Esters.** W. K. Birtwistle.

609,825. **Styrenes and Other Aromatic Compounds.** Dominion Tar & Chemical Co., Ltd.

609,838. **Polymers.** E. I. du Pont de Nemours & Co., Inc.

609,841. **Organo-Silicon Compounds.** A. E. Meadowcroft, C. Shaw, and W. E. Langrish-Smith.

609,940. **Copolymers of Vinyl Chloride.** Distillers Co., Ltd., M. D. Cooke, and J. J. P. Staudinger.

609,997. **Form-Stable, Rubber-Like Polyvinyl n-Butyl Ethers.** General Aniline & Film Corp.

610,020. **Plastic Compositions.** Anglo-Iranian Oil Co., Ltd., E. S. Narracott, A. Milliem, and J. N. Haresnape.

610,037. **Polyvinyl Chloride Compositions.** Anglo-Iranian Oil Co., Ltd., E. W. M.Fawcett, and E. S. Narracott.

610,129. **Stabilized Olefinic Polymers and Copolymers.** C. Arnold (Standard Oil Development Co.)

610,140. **Melt Blending of Aromatic Polyesters with Other Polymeric Materials.** Imperial Chemical Industries, Ltd., J. T. Dickson, and R. J. W. Reynolds.

610,172. **Organic Nitriles.** E. I. du Pont de Nemours & Co., Inc.

610,188. **Process for the Separation of Diolefins from a Mixture of Hydrocarbons.** C. Arnold (Standard Oil Co.).

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CALCO CHEMICAL DIVISION, RUBBER CHEMICALS DEPARTMENT, BOUND BROOK, NEW JERSEY

SALES REPRESENTATIVES and WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

610,203. **Form-Stable Rubber-Like Polyvinyl Isopropyl Ethers.** General Aniline & Film Co.

610,263. **Organic Amino Compounds.** E. I. du Pont de Nemours & Co., Inc.

610,302. **Adhesive Compositions.** British Industrial Plastics, Ltd.

610,304. **Linear Polymers Containing Heterocyclic Rings.** S. J. Allen and J. G. N. Drewitt.

610,311. **Basic Polyamides.** S. J. Allen and J. G. N. Drewitt.

610,326. **Acrylonitrile.** American Cyanamid Co.

610,345. **Adhesive Compositions.** B. B. Chemical Co., Ltd.

610,505. **Polyalkylene Glycols.** H. E. Potts (Carbide & Carbon Chemicals Corp.).

610,728. **Synthetic Rubber Compositions.** B. F. Goodrich Co.

610,819. **Reclaiming Rubber.** U. S. Rubber Reclaiming Co.

610,879. **Preparation of Interpolymers.** E. I. du Pont de Nemours & Co., Inc.

610,898-899. **Chloromethyl Silicon Compounds.** British Thompson-Houston Co., Ltd.

610,901. **Reclaiming Natural and Synthetic Rubber.** U. S. Reclaiming Co. and S. F. Warren.

610,937. **Phenolic Resins for Casting.** Erinoid, Ltd., C. A. Redfarn, and A. M. Bremner.

611,010. **Polystyrene Compositions.** Anglo-Iranian Oil Co., Ltd., E. W. M. Fawcett, A. Millien, and N. Mulhern.

611,012. **Esters of Aminotriazine-Formaldehyde Condensation Products.** Society of Chemical Industry in Basle.

611,013. **Highly Etherified Aminotrazine-Formaldehyde Condensation Products.** Society Chemical Industry in Basle.

611,072. **Manufacture of 2:5 Dimethylfuran and Acetonylacetone.** I. M. Heilbron and E. R. H. Jones.

611,077. **Plasticizing Natural or Synthetic Rubber.** Mo Och Domsjo A.B.

MACHINERY

United States

2,452,565. **Machine for Applying Plastic Material to a Shoe.** C. F. Hammann, Boston, assignor to North American Research Corp., Cambridge, Mass.

2,452,610. **Extruder for Power Cables.** H. Sonnenfeld, Brandford, assignor to Standard Telephone & Cables, Ltd., London, England.

2,452,959. **Machine for Treating Surface Areas of Web Material with Powdered Thermoplastic Substance.** M. H. Sidebotham, Newton, Mass.

2,453,058. **Injection Molding Machine.** B. D. Ashbaugh, Mount Gilead, O., assignor to H-P-M Development Corp., Wilmington, Del.

2,453,088. **Mixing Torpedo for Plastics Extruders.** P. E. Dallmage, Saginaw, Mich., assignor to Dow Chemical Co., Midland, Mich.

2,453,312. **Extruder.** L. C. Frazier, Lakewood, O., assignor to National-Standard Co., Niles, Mich.

2,453,404. **Apparatus for Making Plastic Masses.** W. S. Bohlman, Wilmington, Del., and D. S. Bruce, Lawrence, Kan., assignors by mesne assignments, to United States of America, as represented by the Secretary of War.

2,454,286. **Dip Tank for Thermoplastic Materials.** W. H. Lerner, Lorain, O., assignor, by mesne assignments, to Specialties Development Corp., Belleville, N. J.

2,454,386. **Automatic Press for Molding Plastic Material.** J. B. Whitmore, Bloomfield, W. Makenny, Mountain View, and F. A. Newcombe, Nutley, all in N. J., assignors to Westinghouse Electric Corp., East Pittsburgh, Pa.

2,454,437. **Device for Working Sheets of Thermoplastic Material.** V. C. Ehnhorn, Honolulu, Hawaii.

2,454,661. **Extruder for Plastic Material.** N. Lester, Shaker Heights, and W. H. Schwartz, assignors to Lester Engineering Co., both of Cleveland, both in O.

2,454,666. **Flexible Tube Vulcanizer.** H. I. Morris, San Marcos, Calif., assignor to Yoder Co., Cleveland, O.

Dominion of Canada

452,355. **Vulcanizing Press.** L. E. Soderquist, assignor to McNeil Machine & Engineering Co., both of Akron, O., U.S.A.

452,526. **Apparatus to Cure Pneumatic Tires.** T. A. TeGrotenhuis, Olmsted Falls, assignor to General Tire & Rubber Co., Akron, both in O., U.S.A.

452,717. **Device for Repairing or Retreading Tires.** J. A. W. Llewellen, assignor to Union Rubber Works, Ltd., both of Leeds, Yorkshire, England.

United Kingdom

610,576. **Apparatus for Making Gas-Filled Cable.** British Thomson-Houston Co., Ltd.

610,597-598. **Machines for Processing Rubber, Plastics, Etc.** F. E. Brown.

610,734. **Apparatus for Repairing Rubber Tires.** Dunlop Rubber Co., Ltd., S. W. Gough, and T. J. Brockas.

610,874. **Means for Manufacturing V-Belts.** Wingfoot Corp.

UNCLASSIFIED

United States

2,452,728. **Couplings for Flexible Hose.** E. C. Carling, Stoke Newington, London, England.

2,452,768. **Tire Deflation Signal Device.** E. H. Kuster, Del Ray Beach, Fla.

2,452,795. **Eraser Holding Mechanism.** M. E. Savoie, Cleveland, O.

2,452,823. **Cable Splice.** R. L. Wright, II, Dundalk, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,452,831. **Antiskid Device.** R. J. Burkhart, Nutley, N. J.

2,452,908. **Detachable Hose Coupling.** I. Cowles, Chicago, Ill.

2,453,001. **Combination Dust Cap and Valve Cap Lock for Tire Valves.** J. De Stefano, Long Island City, N. Y.

2,453,013. **Treatment of Yarns or Cords, Including Cellulose Filaments.** J. W. Illingworth, Little Acton, and L. F. Pickup, Rochdale, England, assignors to Dunlop Tire & Rubber Corp., Buffalo, N. Y.

2,453,024. **Coupling.** G. F. Lomelino, assignor of one-half to L. E. Ostrom, both of Olney, Ill.

2,453,273. **Tire Anti-Skid Mechanism.** R. C. Scott, Brighton, N. Y.

2,453,325. **Non-Skid Tire Chain.** W. F. Karstens, Arlington Heights, Ill.

2,453,332. **Improving the Physical Properties of Viscose Rayon Yarn to Make It Suitable for Tire Cord.** F. R. Millhiser, Richmond, Va., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,453,611. **Anti-Skid Device.** E. H. Zimmer, Wyckoff, N. J.

2,453,746. **Wheel and Tire Locking Device.** G. H. Duvall, Jr., Los Angeles, Calif.

2,453,997. **Fitting for Flexible Hose.** W. MacWilliam, Lake Valhalla, assignor to Resistoflex Corp., Belleville, both in N. J.

2,454,005. **Traction Increasing Device for Dual Wheels.** E. P. Pletch, Frankfort, Ind.

2,454,011. **Spark Tester for Insulated Cables and Wires.** J. H. Savage, Welling, assignor to W. T. Henley's Telegraph Works Co., Ltd., Dorking, both in England.

2,454,407. **Non-Skid Device.** F. G. Rosene, Pittsburgh, Pa.

Dominion of Canada

452,323. **Apparatus for Making a Coiled Coreless Yarn.** T. J. Rhodes, Ramsey, N. J., assignor to Dominion Rubber Co., Ltd., Montreal, P. Q.

452,420. **Wheel Fairing.** A. M. Honeywell, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

452,421. **Cord Processing Apparatus.** R. E. Soliday and J. T. Gordon, assignors to Wingfoot Corp., all of Akron, O., U.S.A.

452,464. **Tire Chain.** J. L. Wenzel, Kansas City, Mo., U.S.A.

452,615. **Tire Handling Stand.** O. V. Teegarden, Goshen, Ind., U.S.A.

452,616. **Tire Replacing Tool.** O. V. Teegarden, Goshen, Ind., U.S.A.

TRADE MARKS

United States

441,239. **Crystalite.** Crib sheets, curtains, etc. S. V. Boland, Chicago, Ill, assignor to Boland Mfg. Co., Winona, Minn.

441,245. **Viniseal.** Sheeting for shower curtains, aprons, etc. Kings Rubber Corp., Brooklyn, N. Y.

441,262. **Tri-Ed.** Floor mats. G. E. Snodgrass, doing business as Van Edwards Mfg. Co., Richmond, Calif.

441,276. **Voltron.** Bendable non-metallic tubes and rods. Industrial Synthetics Corp., Irvington, N. J.

441,306. **Luxor.** Window wipers. G. H. Mfg. Co., Philadelphia, Pa.

441,376. **Supplex.** Suspenders, footwear, etc. Industrial Synthetics Corp., Irvington, N. J.

441,432. Representation of a label having three double lines and the letter **"F"** twice within a geometric figure, and the words: **"The Fabri-Form Co."** Thermoplastic resins and sheets, rods, etc. Fabri-Form Co., Byesville, O.

441,393. Representation of a boy holding a ball and upon which is superimposed the words: **"Ruf-N-Tuf Playball."** Footballs, basketballs, etc. **J. B. Singer, Philadelphia,** Pa.

441,394. Representation of a geometric figure above the words **"Conference Champ."** Footballs, basketballs, etc. M. Kaneff, doing business as Mayfair Leather Sportswear, Philadelphia, Pa.

441,421. **Crysto-Cleer.** Storage bags, garment bags, etc. Roland Mfg. Co., Chicago, Ill.

441,432. Representation of a head wearing a rainhat and a geometric figure containing the words: **"Capeau Rain Headwear With Style."** Rainhats and hat covers. W. J. Peters, doing business as Modern Style Products Mfg. Co., New York, N. Y.

502,432. Representation of a label containing three tires and the words: **"Authorized Hawkinson Tread Service. Cured The Way They Run, More Than a Recap!"** and a pennant containing the words: **"Since 1931."** Tire treads. Paul E. Hawkinson Co., Minneapolis, Minn.

502,434. **Hi-Tread.** Tires. Pennsylvania Rubber Co., Jeannette, Pa.

502,445. **Vuecote.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

502,455. **Truflex.** Transmission belts. Gates Rubber Co., Denver, Colo.

502,465. **Redwing.** Rubber packing and hose. Goodyear Tire & Rubber Co., Akron, O.

502,509. **Air Core.** Inner tubes. Kelly-Springfield Tire Co., Cumberland, Md.

502,514. **Homocord.** Conveyer belting. Raybestos-Manhattan, Inc., Passaic, N. J.

502,515. **Flexlastics.** Belting, packing, and hose. Raybestos-Manhattan, Inc., Passaic, N. J.

502,544. **Grand.** Tires, Corduroy Rubber Co., Grand Rapids, Mich.

502,550. **Modernette.** Garden hose. Gates Rubber Co., Denver, Colo.

502,551. **Drugmaster.** Hot water bottles. National Package Drugs, Inc., St. Louis, Mo.

502,576. Representation of a circle containing the letters: **"DW."** Vinyl sheeting. Dussl-Wallace & Co., New York, N. Y.

502,603. Representation of two children's blocks: one block contains the letter: **"H,"** and the other the letter: **"R."** Waterproof pants. Holland-Rantos Co., Inc., New York, N. Y.

502,778. **Hugger.** Hats, caps, gloves, etc. Portis Style Industries, Inc., Chicago, Ill., by change of name from Portis Bros. Hat Co.

502,787. **Crosstown.** Footwear. Consolidated Retail Stores, Inc., St. Louis, Mo.

502,907. Representation of a rectangle containing the word: **"Linmar,"** and a small design containing the letters: **"MFS."** Footwear. Morse Fields Co., Inc., New York, N. Y.

502,954. **Shock-Seal.** Shock absorber repair sets. Micro-Linor Service Corp., Detroit, Mich.

502,963. Representation of a geometric figure containing a representation of a caterpillar tread and the words: **"Slip-Not. The Belt With the Caterpillar Grip."** Transmission belting. Slip-Not Belting Corp., Kingsport, Tenn.

502,969. Representation of a winged foot between the words: **"Super cushion."** Tires. Goodyear Tire & Rubber Co., Akron, O.

502,970. **Nobutton.** Garters and raincoats. John David, Inc., New York, N. Y.

502,976. **All Service.** Tires. Goodyear Tire & Rubber Co., Akron, O.

502,978. **A I M.** Plasticizer. Atlantic Refining Co., Philadelphia, Pa.

502,992. **Amberlac.** Synthetic resinous materials. Resinous Products & Chemical Co., Philadelphia, Pa.

503,065. **Wavesetta.** Combs. American Hard Rubber Co., New York, N. Y.

503,068. **Hawkinson.** Tire treads. Paul E. Hawkinson Co., Minneapolis, Minn.

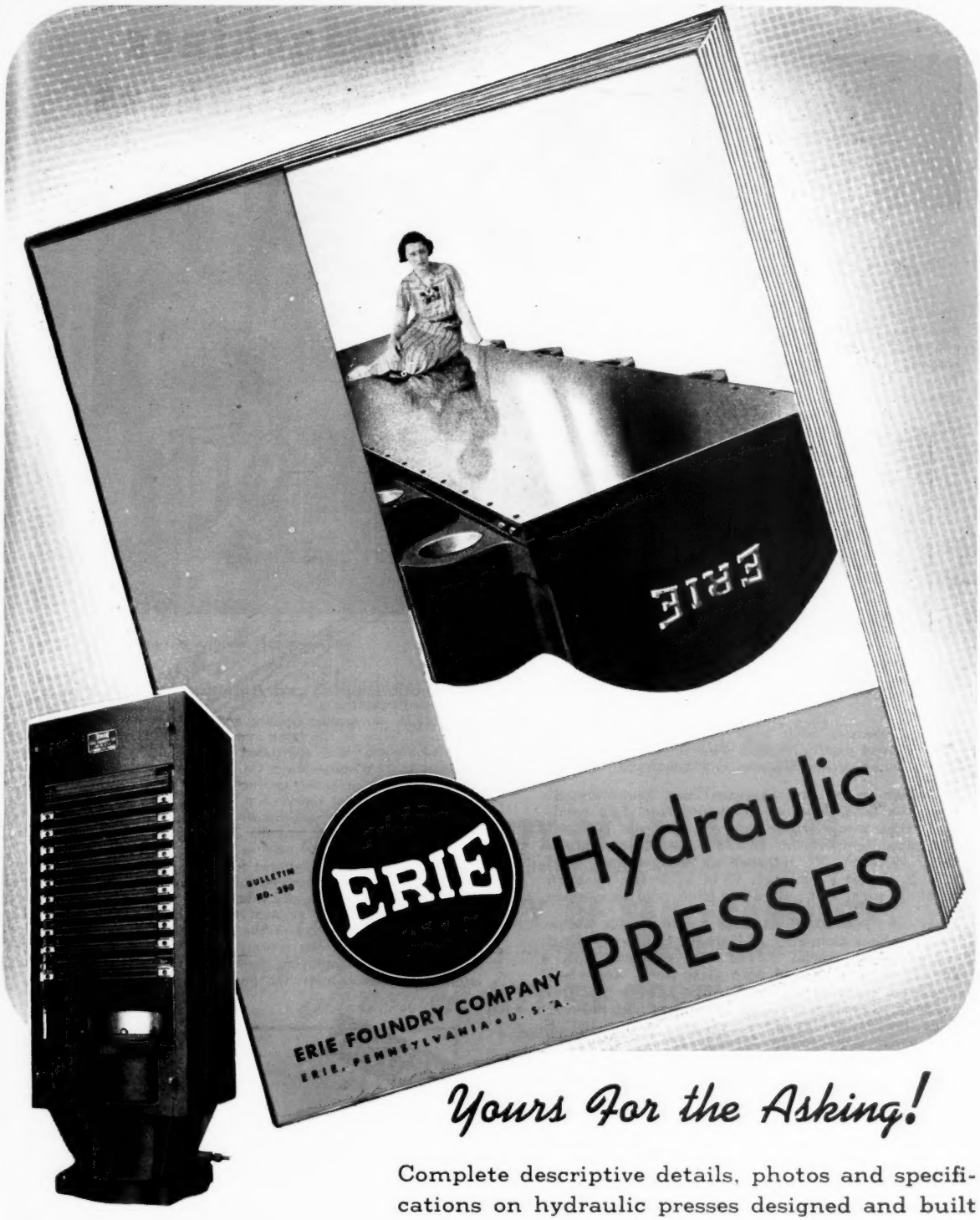
503,113. **Dri-Kwik.** Stamp pads and rubber stamp. Fulton Specialty Co., Elizabeth, N. J.

503,117. **Condor Homo-Flex.** Belting and hose. Raybestos-Manhattan, Inc., Passaic, N. J.

503,216. Representation of a knot above which is the word: **"Slipknot."** Friction tape. Plymouth Rubber Co., Inc., Canton, Mass.

503,217. **Canton.** Friction tape. Plymouth Rubber Co., Inc., Canton, Mass.

(Continued on page 528)



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Complete descriptive details, photos and specifications on hydraulic presses designed and built by Erie Foundry Company are contained in bulletin **350.** Write for it!

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Silicone News

DC SILICONES

Flying Jennys to Jets

In the days of the flying Jenny and the cow pasture airport, comfort was a luxury few airmen had time to consider. Keeping out of the tree tops was a more constant problem than keeping fingers from freezing. But in the sleek new airliners, passengers expect drawing-room comfort. That requires creative engineering because both high and low temperatures are involved and only such relatively new materials as the Dow Corning Silicones can take both extremes.

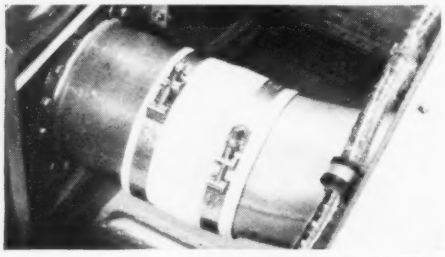

PHOTO COURTESY ARROWHEAD RUBBER CO.

Silastic-coated glass cloth heating duct seals withstand continuous long time exposure to operating temperatures between 350° and 400° F. in new Consolidated Vultee Convair-Liners.*

In designing the new Convair-Liner, Consolidated's engineers faced heating and ventilating duct conditions that would frizzle any conventional material: maximum temperature 450° F.; operating temperature, 350 -400° F.; internal air temperature, 250 - 350° F.; internal pressure, 10 in. of water; misalignment, $\frac{1}{8}$ to $\frac{1}{4}$ inch; vibration from mild to extreme.

That's the problem Consolidated presented to Arrowhead Rubber Company of Vernon, California. Engineers at Arrowhead solved this problem with a Silastic tube reinforced with glass cloth. Arrowhead also uses Silastic, the rubber-like silicone by Dow Corning to produce duct seals that have high performance records at temperatures from −89° to 450° F. and under pressures up to 150 p.s.i. in the newest type jet planes.

That kind of stability is essential to the aircraft industry and is characteristic of all Dow Corning Silicone Products. For the properties of Silastic, phone our nearest branch office or write for pamphlet No. F5-U.

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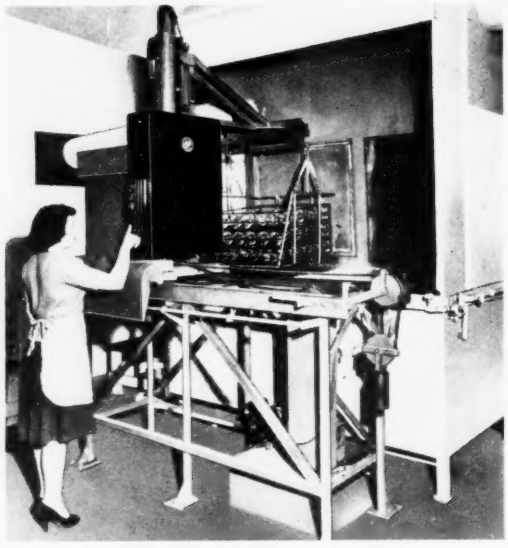
FIRST IN SILICONES

New Machines and Appliances



Wiesner-Rapp Dipping Machine

Automatic Dipping and Agitating Machine

A NEW automatic dipping and agitating machine, of wide application in the latex and other industries requiring consecutive dipping and controlled agitating operations, has been developed by Wiesner-Rapp Co., Inc., Buffalo, N. Y. The new machine gives increased production and quality by eliminating the need of constant supervision, practically complete eliminating of handling, and the achievement of product uniformity.

By placing the load into the container or holder and pushing the "start" button, the load is automatically conveyed to the first tank, dipped, and agitated for a predetermined time interval which can be quickly changed for various operations. The loaded holder is then automatically lifted and moved to the second tank and again dipped and agitated for a preset time interval. The machine then either returns the load to the first tank or moves it to a third one if the process requires more than two tanks. The entire cycle of moving the load between tanks, dipping, and agitating continues until the number of cycles is completed, as

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★ NON-DISCOLORING

★ DISPERSES READILY

★ LIBERATES LARGE VOLUME OF GAS ON DECOMPOSITION

★ PRODUCES SPONGE HAVING SMALL, UNIFORM CELL STRUCTURE

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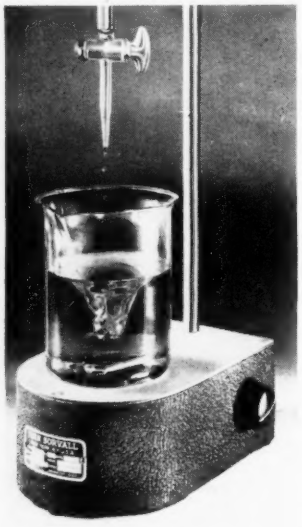
preset on the built-in counter, at which time the load is automatically returned to the starting position for unloading. The cycle may also be stopped at any time by the operator.

An unlimited number of tanks may be arranged within the cycles of the machine, and an unlimited number of time intervals of immersion and agitation in each tank, as well as the number of travels between tanks, may also be arranged. The machine may be operated automatically, semi-automatically, or manually. Simplicity of operation insures trouble-free service life and permits use of inexperienced operators. The machine, wired and ready to plug in, is available either with or without tanks and may be installed over present tanks.



Rosinger Magnetic Stirrer Provides Automatic Stirring during Titrations

Magnetic Stirrer

THE Rosinger magnetic stirrer, a novel laboratory instrument of versatile application, is being marketed by Ivan Sorvall, New York, N. Y. The stirrer is a new device which, when properly used, will perform functions previously either impossible or very difficult to do, it is claimed. The stirrer operates by causing a magnetic bar, covered with a protective coating, to rotate in a liquid contained in a non-magnetic vessel. The rotation of the bar stirs the liquid. The motion of the bar is effected by a rotating magnetic field created by a permanent magnet kept in motion by a motor.

The permanent magnet is encased in a cast-aluminum housing together with a rheostat for controlling the speed of the motor and the rate of stirring. The housing has a flat top made of either white plastic or duralumin. In operation, the liquid to be stirred is placed into a vessel on top of the stirrer, and the stirrer put into motion by dropping the stirring element into the liquid and switching on the rheostat. Because the device operates by magnetic forces, stirring can be affected in both closed or open vessels and under pressure or vacuum. Another advantage is that the stirrer is adaptable for use with very small quantities of liquids as well as for large volumes. The stirring elements, made from Alnico 5 permanent magnets, are supplied in various sizes. They are gold plated for protection against chemical reagents and encased in rubber or plastic, when necessary to eliminate noise and protect the container.

Comparisons of Rubbers

(*Continued from page* 461)

products are made from it.

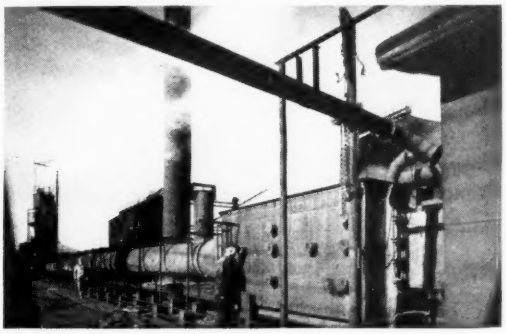
Most of its properties can be varied by compounding, and in most cases where a compromise in properties is allowable, its deficiencies can be minimized.

GR-S can be improved by changes in its manufacture. Some improvements involve a compromise, at the expense of some other desirable property. Current work indicates improvement is possible with no compromise.

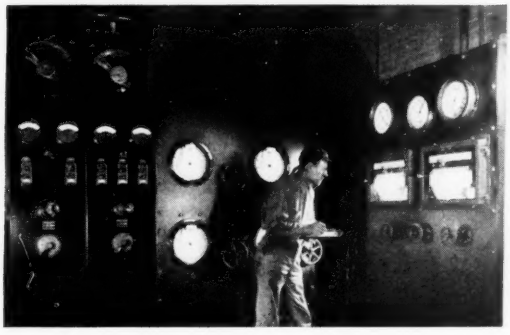
This paper presents brief, but cogent evidence that rubber technologists have produced products of unexpected quality from a somewhat inferior raw material. Improvement of the polymer and continued advances in the compounding art may threaten the supremacy of plantation rubber unless the latter's potential production cost advantages are consistently developed.

HERE'S 3-WAY QUALITY CONTROL FOR CARBON BLACKS

1. PILOT CONTROL Before Witco and Continental blacks ever reach the production stage, pilot pioneering in this miniature plant insures uniformity and high quality of the final product.



2. PRODUCTION CONTROL At one of the world's largest carbon plants . . . Continental Carbon Company, Sunray, Texas . . . the modern control center shown here, in conjunction with the completely equipped control laboratory also located at Sunray, insures a complete checking of quality.



3. AND NOW...RAW MATERIAL CONTROL Announcing the formation of Witco Hydrocarbon Corporation for the production of natural gas (as well as gasoline, butane, and propane). Witco now has complete control of Witco blacks . . . from raw material to delivery.

WITCO CHEMICAL COMPANY, Manufacturers and Exporters

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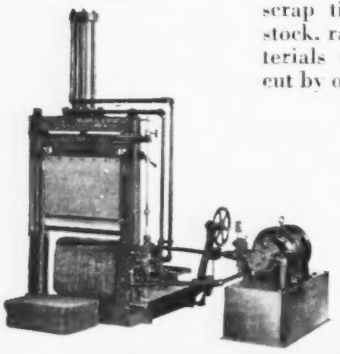
It's advantages like these that make the "Black Rock" 4-KBW HYDRAULIC CRUDE RUBBER CUTTER the machine to use for cutting baled crude rubber, wax, scrap tires, scrap friction stock, rag rope and all materials which can not be cut by ordinary means.



- Fast — efficient — self contained.
- No lubricants needed for cutting.
- Automatic blade return.
- Cutting cycle 9 seconds (Max. stroke).
- Knife opening 30" x 20".
- Size 42½" x 83.
- Height 97".

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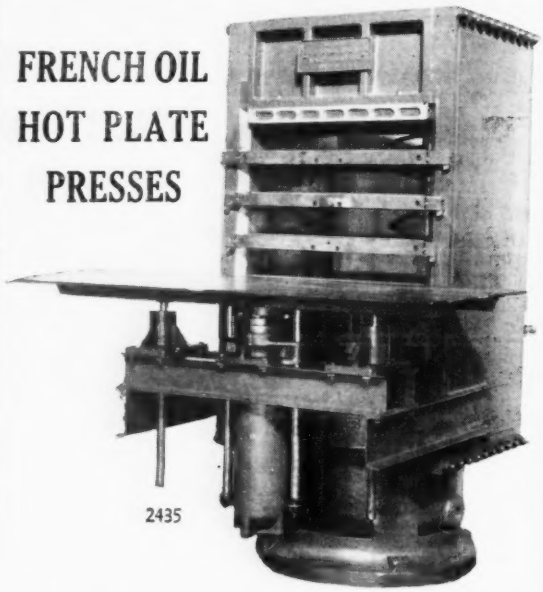

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MALAYA

Annual Report of UPAM

Despite labor troubles, the apparent inability of the British Government to fix a fair and equitable price with America, and the "protection" of synthetic rubber, 1947 was on the whole a good year of progress, says the annual report, 1947, of the United Planters' Association of Malaya, just received.

Many companies, the report continues, were able to make small profits toward recouping the expenses of rehabilitation. During the year, too, steady progress was made in new planting programs though the actual new acreage was not large. Plans for 1948, however, had envisaged rather large-scale new planting involving the use of much jungle reserve land. A problem had been the moving of squatters from private land required for new planting, but the matter had received due attention from the government.

During 1947 the manufacture of crepe sole proved very profitable, and an increased number of estates installed the necessary machinery for preparing soling crepe. A comparatively new development was the number of large Chinese factories which began to buy coagulum for the manufacture of sole crepe. Notable also was the growing interest in shipping latex; several estates turned from the production of sheet rubber to liquid latex, while others were preparing to do so.

Among the vexations besetting planters was the alarming amount of illicit tapping and stealing of rubber during the high-price period.

With regard to labor, it is noted that since 1941 there has been a big increase in the number of Malays and Javanese working on estates in Malaya. Note is further taken that ten new trade unions were formed in the rubber industry in 1947, bringing the total to 49. Most of these seem to function on estate or state basis, but a few cover all of Malaya.

Referring to the activities of the Rubber Research Institute of Malaya during 1947, the report stated that the board had called several special meetings to consider intensified research on quality of rubber and latex, in view of increasing competition from synthetics. Plans for the expansion of research on latex and natural rubber were also discussed with the British Rubber Producers' Research Association. Work seems to have been retarded by the shortage of staff; at December 31, 1947, 11 senior posts remained vacant. During the year J. H. Pidford, chemical engineer, and J. D. Hastings, head of the chemical division, resigned. The director is C. E. T. Mann.

In the chemical division the study of latex processing took up most of the time of the available staff; delays in delivery of apparatus and chemicals hampered many investigations, but toward the end of 1947 there was some improvement here.

The pathological division concentrated mainly on the problem of root disease control in connection with replanting, but moldy rot, which was more prevalent than usual, largely as the result of a combination of labor difficulties plus overly dense indigenous covers, also claimed attention; while other causes for concern were attacks by animals pests and the common leaf diseases on valuable seedlings in nurseries, which caused serious losses. *Oidium* appeared widely, but was not severe.

The botanical division continued to test new clones and clonal seedlings, and several new clones were developed, among them a few yielding more than 2,000 pounds per acre. Tapping experiments have also been initiated, and full circumferential tapping is now being investigated.

Finally it is noted that the Small Holders' Advisory Service has been gradually reorganized, and apparently it is intended eventually to supply smallholders with improved planting material. Meanwhile mention is made of the fact that during the year a part—about 5,000 acres—of the areas felled by the Japanese was replanted under the supervision or on the advice of instructors.

The New RRI Clones

Circular No. 28 of the Rubber Research Institute of Malaya gives some details regarding the new high-yielding clones mentioned above. The clones, which belong to the RRI 500 series, were made in 1930-32 from young hand-pollinated seedling trees derived from crosses between Pilmoor clones and Lunderston N. In 1937, after an initial tapping period of about a year, 23 of the clones were selected for further testing on a large sale, with Pilmoor B 84 as control. In 1940 small quantities of

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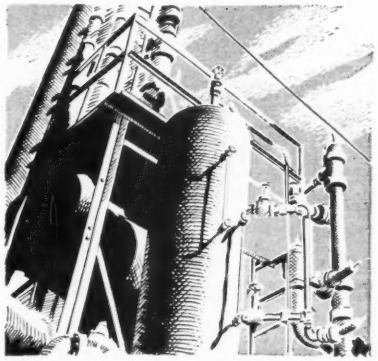

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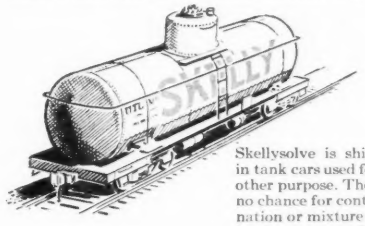

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budwood of ten of the 23 clones were sold to estates. Detailed reports of the behavior of the clones on the estates are not yet available, but such information as has been obtained seems to indicate that on the whole the clones retain much the same order of merit as they do on the experiment station.

There it was found that of the ten clones from which budwood had been distributed to the estates, clone RRI 501 appeared the best; while less vigorous than the control (Pilmoor B 84) its yield in 1947 was 185.6%, as compared with that of the control, or 2,258 pounds, against 1,217 pounds per acre. The new clone has a few weaknesses——two-year-old renewed bark is rather thin, and wound recovery is not good. But the clone is recommended for large-scale planting on suitable soil. Clone RRI 512, yielding more than 1,800 pounds per acre, is also recommended for use on a large scale; yields are expected to improve steadily, and the other characters of the clone are satisfactory. Another clone that yielded more than 2,000 pounds per acre in 1947 is RRI 509; however, since it has less than average vigor and a marked tendency to leaning, it is recommended for use on a small scale where it is found not to lean too badly. RRI 511, also yielding more than 2,000 pounds per acre, is in most respects a fine clone, but since the bark of the stems tends to be bumpy on some soils, it cannot be recommended until more is known about the relation between soil type and bumpy surface.

Agreement with Netherlands India

On March 23, 1948, an agreement was signed between Netherlands India and Singapore and the Federation of Malaya which had as its chief aim the restoration of normal legal trade between these areas.

The provisions of the agreement, which is to cover the present year and to continue thereafter unless either of the governments concerned gives notice of termination require, among the rest, that: (a) all shipments between ports within areas where there are officially recognized banking facilities be financed through these recognized banks; (b) for areas without such banking facilities the Governments of Singapore and the Federation of Malaya will reintroduce control by means of a barter book system or other measures similar to those undertaken in 1940 to control barter trade; (c) the governments concerned will take measures to control all movements of currency between the areas.

The Governments of Singapore and the Federation of Malaya will further endeavor to insure that goods exported in barter trade will consist of articles and commodities required by the inhabitants of Netherlands India and acceptable to the Netherlands India Government. They will also make available to the Netherlands India Government, U. S. dollars arising from reexport from Malaya to dollar areas of all products originating in Netherlands India, less the U. S. dollar cost to Malaya of goods of U. S. dollar origin which are sold by Malayan merchants to the Netherlands Indies.

It is understood that the agreement applies only to areas under Dutch control.

Proposals for implementing the Malayan war damage compensation scheme are to be considered by a Select Committee, and it is hoped to be able to put it into effect by next January. The scheme is expected to require $475,000,000 (Malayan currency). The rubber and the tin industries are to get second priority under the scheme, with each scheduled to receive $85,500,000 (Malayan currency). Loans made to rubber and tin companies for rehabilitation purposes, however, will have to be deducted from awards made under the scheme; so far rubber companies are believed to have received a total of $50,000,000 in such loans.

American Complaints on Packing

Because of their "bitter experience" in regard to packing claims by American buyers of rubber, many Malayan exporters now prefer to ship rubber to Russia and other European buyers, Hea Joo Seang, council member of the Penang Rubber Traders' Association and leading rubber shipper of North Malaya, said in a statement to the *Straits Times* on the subject of proposed legislation to standardize rubber packing. He explained that recent American claims on rubber shipments for reasons that could not be substantiated had created a bad impression among Malayan shippers. Old-established firms, he added, would welcome fair legislation to standardize rubber packing, but "there must be no appeasement of unreasonable American demands." He stressed the need of direct talks between American buyers and Malayan exporters before any legislation was passed on rubber packing.

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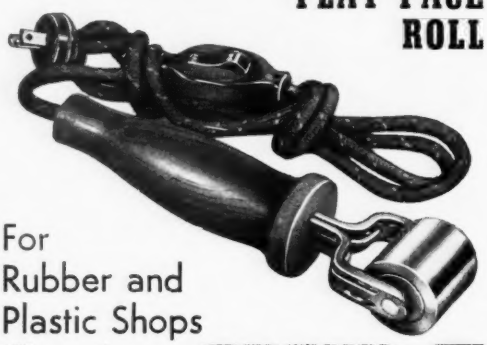

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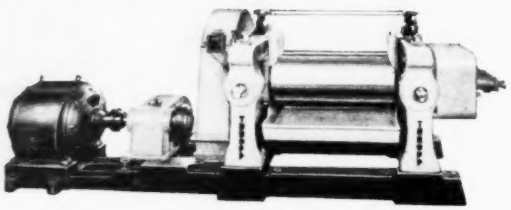

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Increased Freight Rates to the United States

Increased ocean freight rates for cargoes from Malaya to America were scheduled to go into effect on October 1, 1948. The new rates decided upon by the Straits-New York Conference and British Malaya-East Canada Conference follow with regard to rubber: rubber in cases (or bales), $30 (U. S. currency) per 50 cubic feet; latex in drums (or tins,) $30 per 50 cubic feet; latex in bulk, $27.50 per long ton.

The rates for Straits-Pacific are $29.50 and $26.75, respectively on the first two items.

Malayan reports state that three more ships were scheduled to have arrived at Singapore from Russia in October in order to load rubber, and it was expected that rubber shipments to Russia in that month might total 20,000 tons. In September shipments to Soviet ports were more than 14,000 tons, bringing the total Malayan exports of rubber to Russia up to that time to 70,000 tons.

Notes on the Malayan Rubber Industry

While emergency conditions continue in Malaya, a scheme of government insurance is considered imperative. In his review of Malayan business in the first half of 1948, the chairman of the Singapore Chamber of Commerce pointed out that uncertainty over current insurance policies was upsetting normal trading. Thus estates were driven thereby to dispose of their rubber stocks because of the dangers, in the present situation, of loss by arson. This policy again threatens to weaken Malaya's position since, if rubber prices took a downward turn, she would have no other recourse than to accept the best prices going.

The chairman of the Penang Chamber of Commerce in his half-yearly trade review warned that any breakdown in Malayan exports might harm the position of natural rubber in America and result in increased use of synthetics. He also stated that the quality of Malayan shipments had been getting steadily worse and added that the governing authorities were taking steps to weed out the guilty packers.

It does not yet seem possible to draw any valid conclusions from export figures regarding the effect of terrorist activities on rubber production. In June, 1948, production reached the record amount of 60,594 tons, of which 33,246 tons came from estates and 27,348 tons from small holdings. Estates produced 48 tons less and smallholders 11,000 tons more than in May. The opposite trend was observed in July when out of a total of 58,165 tons, estates accounted for 35,193 tons, the highest output since the preceding November and 1,947 tons more than in June; while smallholders produced 22,972 tons or 4,376 tons less than in June. There was a further drop in the total for August to 56,602 tons, but authoritative sources in Kuala Lumpur reportedly do not consider that terrorist activity is the main reason for the decline. However, there may be some significance in the fact that most of the decline over the July figures was due to lower outputs in Johore and Negri Sembilan.

INDONESIA

Importation and Manufacture of Rubber Goods

Tire production in Indonesia has increased steadily since the end of the war, a report to Washington states, and in June, 1948, included 8,000 passenger-car tires and 4,000 truck and bus tires. Estimates put the total production for the year at 85,000 passenger-car tires, 41,000 truck and bus tires, and 900,000 cycle tires.

Rubber is the only one of all the ingredients used in the manufacture of rubber goods that is produced locally, and expansion is being slowed down by the shortage of hard currency exchange required for the importation of the other materials, including textiles and chemicals. Imported raw materials are allotted to manufacturers on a quota basis, and goods are produced at controlled prices.

Domestic production of tires can now cover 95% of the demand for replacements on passenger cars and 50% of truck tire replacements. The remaining tire requirements are filled by imports, of which the United States and Canada supply 80 to 95%.

Currency scarcity is also behind the regulations affecting the importation of belting and some other industrial goods, imports

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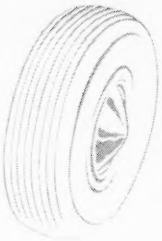

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of which from dollar areas are restricted to prewar importers who, however, may obtain only 20% of the amount of their prewar imports and then only if the price is 20 to 30% below that prevailing in non-dollar areas.

Indonesian imports of rubber products for the first five months of 1948 had a total value of 3,312,514 guilders (one guilder equals $0.376), of which more than one-third came from the United States.

Change in Name Adopted

By an amendment to the Dutch constitution effective September 20, 1948, Indonesia has become the official name of the former Netherlands India, states a bulletin of October 1, 1948, published by the Information Officer for Indonesia, The Netherlands Information Bureau, New York. Other constitutional revisions legalized plans for formation of a sovereign United States of Indonesia and a Netherlands-Indonesian Union.

A later bulletin reports the announcement in The Hague on October 7 of a draft agreement between the Dutch and 13 Federal Territories of Indonesia on the formation of an interim Federal Government. This agreement is considered especially significant as revealing the existence of mutual trust between the Federal Territories and the Dutch. It calls for the transfer of wide powers to an all-Indonesian interim Federal Government to be followed soon by the government of a fully sovereign United States of Indonesia. Common economic interest is the keystone of cooperation between the Dutch and the Federal Territories.

Estates in Production

Despite continued unsettled conditions the number of estates in production has so far increased steadily throughout Indonesia. In August, 1948, there were in all 383 estates in exploitation, of which 354 were producing. The total area of the estates was 698,482 acres, of which 655,073 is tappable, but of which 325,898 acres were actually tapped, yielding 9,120 tons in August. The great majority of all the estates was in Java and Sumatra. In Java, 238 estates were in exploitation, 210 were producing on a total area of 254,954 acres, of which 227,888 acres were tappable, but 151,446 acres actually were tapped. In Sumatra 121 estates were in exploitation, with 120 producing; their total area was 415,254 acres, with 402,363 acres tappable, but only 15,824 acres were in tapping. It may be noted that though Sumatra's tapped area was only a little larger than Java's, the output for the month was considerably higher, 5,576 long tons, against 3,150 long tons. In September production on estates throughout Indonesia increased to 10,668 long tons for a total of 64,976 long tons for the first nine months of 1948.

Total exports for the nine-month period came to 328,125 long tons, of which the areas under Dutch control shipped 210,009 tons, the estates, 77,980 tons; while native holdings exported 132,029 tons.

Local consumption of dry rubber came to 1,674 long tons for the first eight months of 1948.

SEE PAGE 430

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Editor's Book Table

BOOK REVIEWS

"Rubber to Metal Bonding." S. Buchan. Crosby Lockwood & Son, Ltd., 39 Thurloe St., London S.W.7, England. Cloth, 5½ by 8½ inches, 248 pages. Price 21/— ($5.50).

A practical and engineering text on rubber to metal bonding, this book will be welcomed as a reference on a subject which has been given only scanty coverage in the literature. Being an English publication emphasis is placed on the experience of the rubber bonding industry in England which favors the use of brass plating for adhesion of rubber to metal. In this respect the industry does not parallel that of the United States where the great majority of rubber to metal bonding is done by means of cement. Coverage of this non-plating method of adhesion in the book is meager and somewhat out of date, but this failing, once understood, will detract very little from the value of the text. Presentation of the subject matter is made with a clarity approaching that of a shop manual, and many charts, graphs, and photographs are used to illustrate the text.

The book is divided into 18 chapters covering the following subjects: introduction; plating plant; cleaning solutions; brass plating solutions; methods of analysis; electroplating; natural rubber compounding; synthetic rubber compounding; process control; processing; modern molding; physical examination of brass deposits; mechanism of the rubber to brass bond; properties of the rubber to brass bond; bonding cements (non-brass), including ebonite, latex-albumen, thermoprenes, rubber hydrohalides, chlorinated rubber, and Desmodur R; bonding vulcanized rubber; nature of the non-brass bond; and importance of design. A bibliography and subject index are appended.

"The Chemical Formulary. Volume VIII." H. Bennett, Editor-in-Chief. Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. Cloth, 5½ by 8½ inches, 470 Pages. Price $7.

Following the presentation of the preceding volumes of the series, this new addition gives thousands of new, practical, and tested formulae together with full and simple directions for making each product. Formulae are again grouped under the following headings; adhesives; cosmetics; drug products; emulsions and dispersions; farm and garden preparations; food products; ink and allied products; insecticides, fungicides, and weed killers; leather treating preparations; lubricants and oils; construction materials; metals and their treatment; paint, varnish, lacquers, and other coatings; paper; photography; plastics, rubber, resins, and waxes; polishes; pyrotechnics and explosives; soaps and cleaners; textiles; and miscellaneous. Reference tables are appended together with a list of materials and their suppliers, and a comprehensive subject index.

"Higher Mathematics for Engineers and Physicists." Ivan S. and Elizabeth S. Sokolnikoff. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Cloth, 5¼ by 8½ inches, 596 pages. Price $5.

This book is of value to all engineers since it supplies the mathematical references and background necessary for the study of physical sciences. The approach to the subject is practical in nature, and the subject matter has been selected to include topics of most frequent and immediate use in the applied sciences. Chapter headings cover infinite series; Fourier series; solution of equations; partial differentiation; multiple integrals; line integral; ordinary differential equations; partial differential equations; vector analysis; complex variables, probability; and empirical formulae and curve fitting. Each chapter is organized into sub-sections, which include typical problems, the answers to which appear in the back of the book.

NEW PUBLICATIONS

"Indonex Plasticizers in Extruded Mechanical Goods." Circular No. 13-29, September 25, 1948. Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill. 4 pages. Formulations and test data are given to show the effect of Indonex in three series of typical extrusion compounds, two with natural rubber and one with GR-S.

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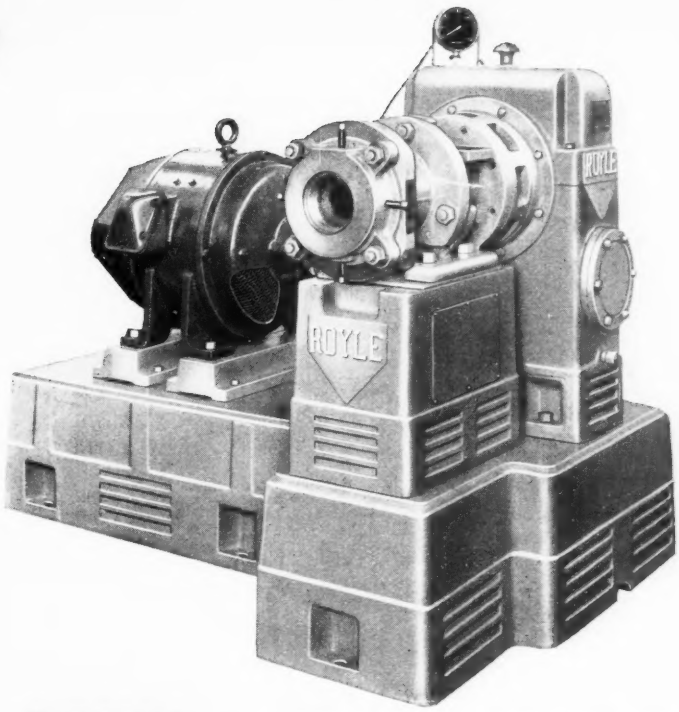

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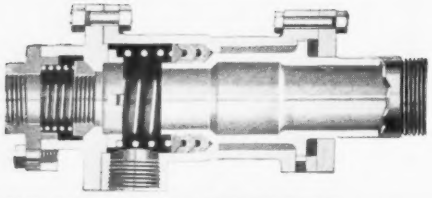

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"The Reaction of Sulfur and Sulfur Compounds with Olefinic Substances." The British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts., England. Publication No. 96, 28 pages. **"Part I. The Reaction of Sulfur with Monoolefins and with Delta-1:5-Diolefins."** E. Harold Farmer and F. W. Shipley. Investigation of the reaction of sulfur and various types of mono- and polyolefins shows that poly-olefins displaying suitably spaced unsaturation become both inter- and intra-molecularly cross-linked by the sulfur taken into combination. The structural factors and chemical mechanisms contributing to the two types of cross-linking are discussed, particularly with respect to sulfur vulcanization of rubber. **"Part II. Mechanism of the Reaction of Hydrogen Sulfide with Monoolefins, Diisoprenes, and Rubber."** Ralph F. Naylor. Hydrogen sulfide combines with mono- and dioleſins under pressure to give normal adducts in the presence of sulfur or a metallic sulfide, and abnormal adducts in the presence of ultra-violet light. The adducts of both types include alkanethiols and alkyl sulfide and disulfides. The principal reaction products with two di-isoprenes, dihydromyrcene and geraniolene, are cyclic sulfides of the tetrahydrothiopyran series; while rubber gives sulfides of the cross-linked type. **"Part III. The Reaction of Sulfur with Squalene."** G. F. Bloomfield. It is shown that sulfur reacts with squalene in a manner very similar to that observed with dihydromyrcene, and that an intramolecularly linked unimolecular sulfide and an intermolecularly linked polysulfide are formed. **"Part IV. The Thermal Decomposition of Organic Polysulfides, and Its Contribution to the Sulfur-Olefin Reaction."** G. F. Bloomfield. Organic polysulfides decompose with fission of the sulfur-sulfur bonds, and in the presence of olefins form mixed mono- and poly-sulfides. The major part of the monosulfide product is fully saturated, but unsaturation appears in the polysulfide portion. The polysulfides are capable of producing monothio cross-links between the original olefinic molecules only insofar as they are able to yield up elementary sulfur to the olefin. Publication No. 97, 4 pages. **"Part V. Rubber Vulcanization."** George F. Bloomfield. Previously reported work is extended to rubber vulcanization, with the following conclusions: (1) loss of unsaturation follows the general rule of one double-bond for each sulfur atom introduced; and (2) vulcanization is slightly inhibited by oxygen, but catalyzed by hydrogen sulfides and mercaptans. Results indicate that mercaptan groups formed in the initial stages of vulcanization may be converted to di- and poly-sulfide linkages when basic accelerators, zinc oxide, or zinc soaps are present.

"Compounds G-4 and G-11, An Annotated Bibliography." *Sindar Reporter*, issue of Autumn, 1948. Sindar Corp., 330 W. 42nd St., New York 18, N. Y. 12 pages. This issue of the *Reporter* gives a bibliography of almost 100 references in articles and patents to Compounds G-4 and G-11. An abstract of each reference is also given.

"DC 200 Silicone Fluids." Dow Corning Silicone Note Book, Fluid Series No. 3. Dow Corning Corp., Midland, Mich. 32 pages. This booklet gives extremely detailed and comprehensive data on the properties of the DC 200 Silicone Fluids, including such properties as lubricity, compressibility, light and sound transmission, and physiological effects in addition to the more commonly used properties.

"Rubber Developments," Vol. 1, No. 5: September, 1948. British Rubber Development Board, Market Bldgs., Mark Lane, London E.C.3, England. 48 pages. This issue contains articles on "A New Form of Rubber," by G. Martin; "Latex Processes and Potentialities, 5. Modified Latex," by W. H. Stevens; "Commercial Aspects of Natural and Synthetic Rubber Latices," by R. V. Yohe; "Tires," by L. R. Mernagh; "Uses of Rubber in Farm Equipment," by H. J. Hine; "The Use of Rubber Chair Pads on Railway Tracks in France," by G. Colin; and stories on other rubber developments and products.

"Stauffer Chemicals." Stauffer Chemical Co., 420 Lexington Ave., New York 17, N. Y. 108 pages. The first part of this illustrated catalog gives data on the company's individual products, including properties, grades, uses, packing and shipping, and stocks. The second part covers the company's agricultural sulfurs; next comes a section on products made by the various Stauffer divisions; and the booklet concludes with a section on reference charts and tables.

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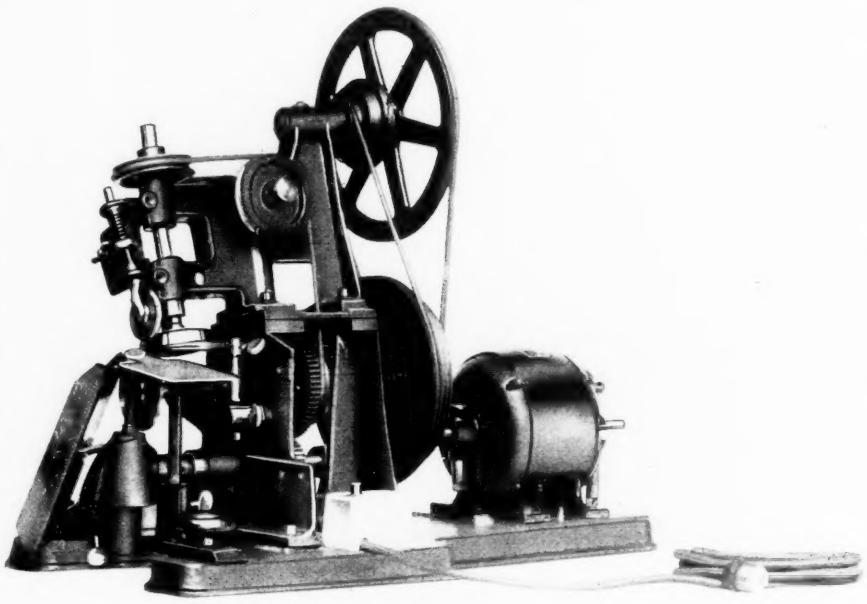

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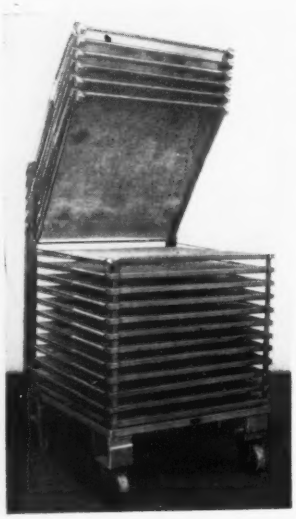

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"Philblack A in Mixtures of GR-S and Whole Tire Reclaim for Low-Cost Tire Treads." Philblack Bulletin No. 14, November, 1948. Phillips Petroleum Co., Akron, O. 2 pages. Formulations and test data are presented to show that Philblack A in mixtures of GR-S and whole tire reclaim produces low-cost treads of good quality and possessing good abrasion resistance and flex life.

"It's New!" Goodyear Tire & Rubber Co., Inc., Akron 16, O. 16 pages. This illustrated booklet gives information on the company's chemical division, its personnel, and those of its products which have become available this year, including Tuf-lite, Pliovic, Pliolite, Pliolites S-3, S-4, and S-7, and Pliolite Latices 150 and 170.

"The Rubber Industry in Germany during the Period 1939-1945." T. R. Dawson. British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. British Intelligence Objectives Sub-Committee Overall Report No. 7. Paper, 6 by 9½ inches, 150 pages. Price, $0.90. This comprehensive report presents detailed information on German production of synthetic rubbers; synthetic latices, including production, properties, analysis, and processing; properties of Buna and other rubbers; analysis and testing of Buna rubbers; compounding ingredients, including reinforcers, fillers, accelerators, antioxidants, plasticizers, tackifiers, and pigments; processing Buna rubbers, including packaging, plasticization, mill room practice, rubber-to-metal bonding, reclaiming, and machinery; and Buna rubber products, including tires, belting, cable insulation, footwear, sporting goods, hose and tubing, mechanicals, flooring, surgical goods, proofed goods, cellular rubber, and hard rubber. A bibliography and subject index are appended.

"Stokes-Standard Semi-Automatic Molding Presses and Other Stokes Equipment for Plastics Molding." Catalog No. 478. F. J. Stokes Machine Co., Philadelphia 20, Pa. This bulletin describes and illustrates the company's line of semi-automatic and automatic compression molding presses, plunger presses, special molding presses, and preforming presses. Some typical installations are also shown.

"A.S.T.M. Standards on Plastics." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Paper, 6 by 9 inches, 612 pages. Price, $4.50. This fourth edition of plastics standards, sponsored by A.S.T.M. Committee D-20 on plastics, includes 27 specifications for materials, 85 test methods, 11 recommended practices, and six standards on nomenclature and definition of terms.

"Production Management—Productivity, Costs, Wages, Labor Relations." 1948 Edition. Albert Ramond & Associates, Inc., Tribune Tower, Chicago 11, Ill. 46 pages. Amply illustrated with charts and diagrams, this booklet indicates practical solutions for several of industry's current problems about costs, wages, productivity, and labor relations. While essentially promotional in nature, this booklet also includes much information of interest to all employers.

"Cyclotherm Automatic Steam Generators." Bulletin P-1. Cyclotherm Corp., New York 4, N. Y. 6 pages. The operating principles and design characteristics of the company's automatic steam generators are described and illustrated in this bulletin. Data include automatic firing sequence, electronic controls, flame characteristics, construction details, performance data and standard ratings.

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Proof of the effectiveness of this silicone mold lubricant is the easy release of drill stem protectors molded for the Rubber Sleeve Specialty Company of Oklahoma City. These stem protectors measure 7 1/2" in height with an outside diameter of 4 1/16", an inside diameter of 2" and a 2 3/8" bevel on both ends. That's a tough assignment for any mold lubricant. But, it's on the tough unloaders that DC Mold Release Emulsion No. 35 more clearly demonstrates its superiority to any other type of mold lubricant.

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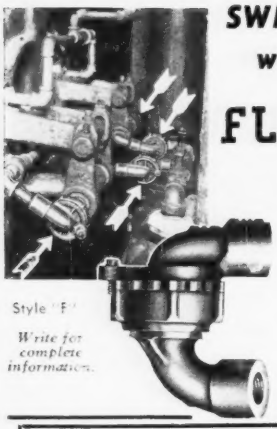

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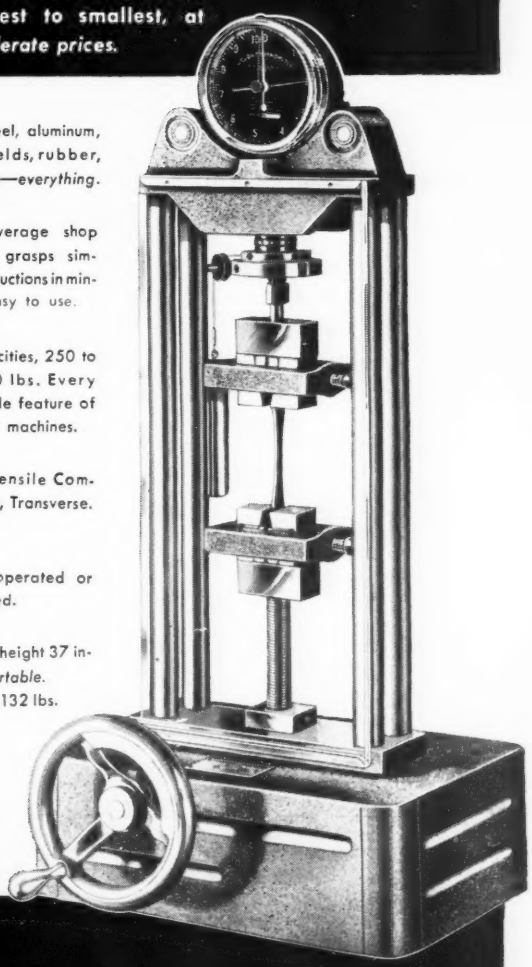

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Standard Contract:						
Jan.	20.79	18.74	18.50	18.90	18.64	18.75
Mar.	20.65	18.40	18.10	18.75	18.50	18.35
May	20.45	18.30	18.00	18.55	18.40	18.15
July	20.35	18.20	17.90	18.45	18.30	18.05
Sept.	20.25	18.10	17.80	18.35	18.20	17.95
Nov. 1950	20.15	18.00	17.70	18.25	18.10	17.85
Jan.	20.05	17.90	17.60	18.15	18.00	17.75
Weekly sales vol., tons	2,220	1,410	1,180	730	320	110
No. 1 Contract						
Mar.	21.15	18.60	18.40	18.90	18.75	18.65
May	21.00	18.43	18.35	18.70	18.60	18.60
July	20.80	18.30	18.15	18.65	18.53	18.45
Sept.	20.60	18.15	18.00	18.50	18.42	18.25
Nov. 1950	20.50	18.05	17.90	18.40	18.32	18.15
Jan.	20.40	17.95	17.80	18.30	18.22	18.05
Weekly sales vol., tons	1,110	1,970	3,850	6,490	5,130	2,190
Total sales vol., tons	3,330	3,380	5,030	6,490	5,130	2,300

RUBBER futures prices moved irregularly upward on the Commodity Exchange during December in the face of a nervous market. The major factor contributing to the price advance was a report that Russia had purchased as much as 5,000 tons of rubber at Singapore. Other factors contributing to the rise were trade reports of smaller shipments from Netherlands India during November and declining stocks of natural rubber in the United States. Stocks at the end of October were 118,658 long tons, the lowest in five months and the second lowest total of the year. Tending to offset these reports and hold values down was news that shipments from the Malayan Union during November were the highest for the year, 90,757 tons, as compared with 77,589 tons exported in October.

The news of renewed hostilities between the Dutch and the Indonesian governments had only a limited effect on the market because of the conflicting factors involved. Should the Indonesians follow their declared plan of a scorched earth policy, crude rubber production in 1949 would be materially reduced. On the other hand, should the Dutch capture the major production areas and obtain the manpower to operate them, it is believed that they could achieve a greater output than was previously anticipated from these areas.

With respect to actual price movements on the Exchange, March rubber futures in the standard contract opened the month at 17.50¢, the monthly low, reached a peak of 18.85¢ on December 13, and closed at 18.40¢ on December 31. Other futures prices in this contract maintained identical motion, and price differentials between the different months were fairly constant. In the No. 1 contract March futures began at 17.90¢ on December 1, reached a high of 19.15¢ on December 13, and closed the month at 18.80¢. Fulfilling the expectations of many traders, the new No. 1 contract continued to account for the great majority of trading on the Exchange. Of the total volume of 19,270 tons sold during December, 17,460 tons were in the new contract and only 1,810 tons in the standard contract.

New York Outside Market

WEEK-END CLOSING PRICES

	Oct. 30	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Dec. 25
No. 1 R. S. S.:						
Dec.	21.38	19.00	18.88	19.00	18.88	19.00
Jan.-Mar	21.25	18.75	18.75	18.88	18.88	18.88
Apr.-June	21.25	18.63	18.38	18.63	18.75	18.75
July-Sept.	....	18.50	18.25	18.50	18.50	18.63
No. 3 R. S. S.	20.25	18.00	17.88	18.00	17.88	18.00
No. 2 Brown	15.50	14.25	14.88	15.25	15.00	15.13
Flat Bark	11.50	11.50	12.13	11.75	12.00	12.13

DESPITE slow factory demand for rubber on the New York Outside Market, prices moved upward last month, following the lead of the futures market and the strong tone of foreign physical markets. The spot price for No. 1 R.S.S. was 18.00¢ on December 1, the low point of the month. Thereafter the price moved irregularly higher, reaching a peak of 19.38¢ on December 13 and closing at 18.88¢ on December 31. No. 3 R.S.S. fluctuated from a low of 17.13¢ to a high of 18.38¢; while No. 2 Brown moved through a 14.25¢ to 15.50¢ range. As in the past few months, Flat Bark continued almost entirely unaffected by price fluctuations in the higher quality grades. Flat Bark sold at 11.25¢ on December 1, reached a high of 12.50¢ on December 13, and closed the month at 12.25¢, moving through a range almost unchanged from that of previous months when No. 1 sheets were at high levels.

Latices

CONSUMPTION of *Hevea* latex rose markedly in October and estimates for November show a comparable rate, although December estimates indicate some slight falling off, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's December *Rubber Report*. Expectancies for the first quarter of 1949 are in line with these increases; while second-quarter estimates are for still higher consumption tonnages. Mr. Nolan gives estimated October *Hevea* latex imports of 2,728 long tons dry weight; consumption, 2,448 long tons; and month-end stocks, 11,404 long tons.

The price of GR-S latex has now held firm for a number of years, and, pending an unexpected change in government rubber policies, it is reasonable to expect that this price will not be reduced. *Hevea* latex at 27.75¢ a pound, in comparison, is still high priced and suffers competitively despite its acknowledged higher quality, except in those items which must be made from *Hevea* regardless of cost. On the other hand some applications will employ GR-S latex also regardless of relative cost. Between these two extremes of "necessary" use lies a middle ground of uses which may amount to more than 1,000 tons a month, Mr. Nolan states, but factors other than mere cost enter into a competitive consideration of the two latices for specific uses. Thus there have been some opinions expressed that *Hevea* latex at 25¢ a pound could crowd GR-S latex out of a portion of this field, although there has been only vague conjecture whether or not such a price would enable more latex foam to be sold.

SCRAP RUBBER

THE scrap rubber market continued dull during December, although there were some scattered reports of a very slightly improved situation in the market. It was said that scrap shipments to Buffalo were moving at a somewhat better rate, but in general there was no departure from the hand-to-mouth business prevalent for the past months. Exports still provide the stimulus to the current market, and demand is good from the Far East, particularly for truck sizes. Exporters are still facing difficulties in shipping scrap rubber, and there have been signs of dissatisfaction over close profit margins.

Some price changes occurred during December, but were mixed in nature and not indicative of any particular market trend, either up or down. Mixed auto tubes fell from 4.00¢ per pound at Akron to the eastern price of 3.50¢. On the other hand red passenger tubes rose from 7.00¢ to 7.25¢ per pound at Akron. Black passenger tubes were selling at 4.25¢ per pound in the East and at Akron, after having been quoted at 4.00¢ and 4.50¢, respectively. Black truck tubes dropped from 4.75¢ per pound to 4.00¢ at Akron.

Following are dealers' buying prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$11.50	$13.00
S-A, G passenger (natural)	nom.	nom.
Truck (natural)	nom.	nom.
Peelings (natural), No. 1	50.00	50.00
2	31.00	31.00
3	29.00	29.00
	(¢ per Lb.)	
Mixed auto tubes	3.50	3.50
Red passenger tubes	7.00	7.25
Black passenger tubes	4.25	4.25
Truck tubes	4.00	4.00
Mixed puncture-proof tubes	0.50	0.50
Air brake hose	nom.	nom.

RECLAIMED RUBBER

CONDITIONS in the reclaimed rubber market during December remained unchanged from the previous month. Production and demand for reclaim were at satisfactory levels; exports continued to show slight improvement, and the industry retained its cautious outlook on prospects for the immediate future in view of unsettled conditions in the crude rubber market.

Final September and preliminary October statistics on the domestic reclaimed rubber industry are now available. Production of reclaim during September totaled 21,805 long tons: consumption 23,478 long tons; exports, 740 long tons; and month-end stocks, 30,198 long tons. Preliminary figures for October show a production of 23,854 long tons; consumption, 22,959 long tons; exports, 848 long tons; and end-of-month stocks, 31,339 long tons.

There were no changes in reclaimed rubber during December.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8.5 / 9
Peel	1.18-1.20	8.5 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.75
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

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The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

RAYON

DOMESTIC shipments of rayon during November totaled 92,900,000 pounds, 1% below the October level. For the first 11 months of this year deliveries of rayon amounted to 1,005,900,000 pounds, 16% higher than corresponding 1947 period shipments. November filament yarn deliveries totaled 71,400,000 pounds, consisting of 45,800,000 pounds of viscose and cupra and 25,600,000 pounds of acetate; while staple deliveries amounted to 21,500,000 pounds, of which 15,300,000 were viscose and the remainder acetate. Filament yarn shipments for the first 11 months of 1948 totaled 762,700,000 pounds, of which 500,500,000 pounds were viscose and cupra and 262,200,000 pounds were acetate. Rayon stocks held by producers at the end of November amounted to 15,000,000 pounds. Of this total, 7,100,000 pounds were viscose and cupra yarn, 3,000,000 pounds were acetate yarn, and 4,900,000 pounds were staple.

No changes occurred in rayon tire yarn and fabric prices during December, and current prices are listed below:

Rayon Fabrics

Tire Yarns	
1100/480	$0.55 / $0.56
1100/490	.57
1150/490	.57
1650/720	.54 / .56
1650/980	.56
1900/980	.56
2200/960	.55
2200/980	.55
Tire Fabrics:	
1100/490/2	.71
1650/980/2	.685 / .70
2200/980/2	.67

COTTON AND FABRICS

New York Cotton Exchange Week-End Closing Prices

	Oct. 30	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Dec. 25
Mar.	31.02	31.84	32.49	32.18	32.18	32.18
May	30.76	31.63	32.38	31.93	31.97	31.94
July	29.57	30.77	31.76	31.15	31.09	31.03
Oct.	27.32	28.59	29.27	28.68	28.50	28.46
Dec.	27.09	28.39	29.04	28.49	29.32	28.28
1950						
Mar.	26.92	28.16	28.83	28.27	28.14	28.09

COTTON prices fluctuated irregularly on the New York Cotton Exchange during December in a market that was highly erratic. Market undertones ran the gamut from steady to nervous and activity varied between extreme dullness and trading flurries. As the month progressed, a noticeable increase in hedging took place, and trade sentiment turned bearish in view of the estimated carry-over of 6,000,000 bales and reports of cancellations of ECA cotton allotments. Both France and Holland reported cutbacks in order to use the funds for other purposes; while Belgium was reported as being dissatisfied over having to take 22% low-grade cotton in her allotment.

Despite irregularity, cotton prices fluctuated in a relatively narrow range during December. The 15/16-inch middling spot price began the month at 32.78c, reached a high of 33.14c on December 27, and closed the month at 33.01c. March future prices also showed little overall change, starting at 32.31c on December 1, reaching a high of 32.49c on December 4, and closing at 32.33c on December 31.

Fabrics

Wide industrial fabrics moved strongly in almost all categories during the first two weeks of December, then fell off following the usual year-end market pattern. Sales were otherwise in a sound position with approximately a third of the first-quarter production already under contract. Chafer fabrics were in good demand from the tire trade which bought January goods in fair quantities. Single filled chafers showed the most active movement in this category.

Sateens were in good demand and sold into the first quarter, through the end of March. Inventories of sateens were at low points at the mill level, and greatest demand came from the coating and the automotive industries. Broken twills and drills followed the same pattern as sateens, being sold into March. Ducks of all types were in strong demand, and headlinings moved at a very active pace. Hose and belting ducks were active in the market and continued to be priced at 66.5c per pound.

Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	Nov., 1948
15" & 16" D. C. Passenger	
16x4.00E	236,574
16x4.50E	146,789
15x5.00E	153,650
16x5.00F	21,141
15x5.50F	33,267
16x5.50F	14,097
16x4.00E—Hump	11,121
16x4.50—Hump	17,235
15x5.00F—Hump	3,823
15x4½-K	54,365
16x4½-K	97,831
15x5-K	370,594
16x5-K	134,091
15x5½-K	145,359
15x6-L	108,812
16x6-L	14,887
15x6½-L	120,191
15x4½-K—Hump	174,476
15x5-K—Hump	127,337
15x5½-K—Hump	86,914
17" & Over	
18x2.00BB	3,713
18x4.00F	1,873
Truck-Bus	
17x5.0	28,141
18x5.0	5,414
20x5.0	12,426
20x5.00 S	10,929
17x5.5	16,378
20x5.50S	32,922
20x6.0	137,625
20x6.00S	89,183
15x6.00T	135
20x6.00T	10,393
24x6.00T	1,328
15x6.5	1,020
20x6.5	2,185
15x6.50T	1,217
20x6.50T	23,208
18x7.0	314
20x7.0	15,144
20x7.00T	3,931
20x7.33V	7,490
22x7.33V	1,623
20x7.5	13,022
22x7.5	10,755
20x7.50V—Flat Base	6,997
22x7.50V—Flat Base	2,555
20x8.0	660
22x8.0	812
20x8.00V	8,238
22x8.00V	1,634
19x8.37V	201
24x8.37V	536
Semi D.C. Truck	
15x5.50F	42,131
16x5.50F	20,575
16x6.50H	19,629
Tractor & Implement	
12x2.50C	20,845
12x3.00D	35,454
15x3.00D	23,918
18x3.00D	5,642
19x3.00D	17,537
21x3.00D	1,338
24x3.00D	816
36x3.00D	1,949
18x3.25E	2,517
20x4.50E	2,399
18x5.50F	7,160
20x5.50F	9,695
24x5.50R	5,425
24x6.00S	1,717
36x6.00S	894
20x8.00T	878
24x8.00T	5,161
28x8.00T	2,640
36x8.00T	569
W5-24	1,200
W5-30	5,004
W7-24	11,767
W7-36	874
W8-24	4,929
W8-36	2,725
W9-24	2,346
W9-28	42,644
W9-36	860
W9-38	997
W10-28	2,983
W10-38	1,507
DW8-42	1,259
DW9-38	4,444
DW10-38	19,537
DW10-42	160
DW11-24	967
DW11-38	7,802
DW12-30	2,492
DW12-34	4,636
DW14-30	731
DW16-26	1,504
Industrial	
8x2.50C	160
9x4.00E	90
10x5.00F	102
12x5.00S	122
Earth Mover	
20x11.25	117
24x11.25	192
24x13.00	291
32x13.00	81
24x15.00	241
25x15.00	13
Total	2,873,102

Compounding Ingredients—Price Changes and Additions

Cryptone BT	lb.	$0.0825	/ $0.085
ZS	lb.	.135	/ .1375
Florence Green Seal-8	lb.	.1725	/ .175
Red Seal-9	lb.	.1675	/ .17
White Seal-7	lb.	.1775	/ .18
Hi-White R	ton	15.00	13.00
Horsehead XX-4, -78	lb.	.155	.1575
Hydratex R	ton	30.00	
Kadox-15, -17, -72	lb.	.155	.1575
-25, -515	lb.	.1775	.18
Lehigh, 35% Leaded	lb.	.17⅞	.18⅛
50% leaded	lb.	.17⅞	.18⅛
Monoplex 5	lb.	.70	.71
DBS	lb.	.58	.59
DOS	lb.	.69	.70
Paragon	ton	13.50	31.50
Standard, 5% leaded	lb.	.155	.1575
Suprex	ton	14.00	33.00

United States Motor Vehicle Factory Sales

(Number of Vehicles)

1946	Passenger Cars	Motor Trucks	Motor Coaches	Total
1st 9 mos	1,329,345	615,028	6,582	1,321,474
1947				
1st 9 mos	2,570,122	913,089	14,306	3,497,517
1948				
Jan.	305,081	99,200	1,382	405,663
Feb.	274,847	107,054	1,101	383,002
Mar.	349,998	140,606	1,430	492,034
Apr.	308,071	128,963	1,056	438,090
May	225,461	111,789	1,288	338,538
June	312,406	117,572	1,068	431,046
July	356,764	116,780	1,012	474,556
Aug.	348,782	111,760	771	461,313
Sept.	301,251	111,224	1,143	413,618
1st 9 mos	2,782,661	1,044,948	10,251	3,837,860

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320 BROADWAY
NEW YORK

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Exports of Domestic Merchandise

	September, 1948	
	Quantity	Value
UNMANUFACTURED, Lbs.		
Chicle	65,829	$32,342
Synthetic rubbers: GR-S	959,069	187,666
Butyl	600	116
Neoprene	410,282	138,149
Nitrile	37,736	16,470
"Thiokol"	4,913	3,047
Other, except polyisobutylene	85,865	18,259
Reclaimed rubber	1,657,196	127,898
Scrap rubber	2,301,147	65,193
TOTALS	5,522,637	$589,140
MANUFACTURED		
Rubber cement	32,473	$47,155
Rubberized fabric: auto cloth	178,337	105,259
Piece goods and hospital sheeting	32,538	32,063
Rubber footwear:		
Boots	13,375	56,631
Shoes	19,910	45,638
Rubber-soled canvas shoes	79,874	144,467
Soles	24,278	62,073
Heels	37,249	31,790
Rubber soling and toplift sheets	143,552	28,944
Gloves and mittens	9,434	33,699
Drug sundries: water bottles and fountain syringes	22,314	12,408
Other		130,536
Rubber and rubberized clothing		57,893
Balloons		88,200
Toys and balls		43,771
Bathing caps	1,044	3,561
Rubber bands	1,825	1,668
Erasers	13,622	12,083
Hard rubber goods: battery boxes	32,310	19,899
Other electrical goods	91,138	56,070
Combs, finished	2,235	2,506
Other		11,079
Tire casings: truck and bus	68,545	3,039,291
Auto	38,484	529,704
Inner tubes: auto, truck, and bus	67,204	244,240
Other casings and tubes, except auto	38,348	794,299
Solid tires: auto and truck	3,447	84,358
Other	35,987	17,536
Tire repair materials: camelback	78,274	22,616
Other	105,165	64,057
Rubber and friction tape	25,183	18,782
Belting, auto fan belts	60,084	79,105
Other	852,203	750,924
Hose and tubing: garden hose	17,392	6,099
Other	477,202	328,777
Rubber packing	185,316	116,563
Mats, flooring, tiling	447,274	123,984
Thread: bare	9,858	15,800
Textile covered	8,137	24,676
Gutta percha manufactures	31,181	20,381
Latex and other compounded rubber for further manufacture	322,029	119,915
Other rubber products		337,114
TOTALS		$7,768,604
GRAND TOTALS, ALL RUBBER EXPORTS		$8,357,744

Reexports of Foreign Merchandise

UNMANUFACTURED, Lbs.		
Crude rubber	1,151,410	$229,016
Jelutong and gutta percha	5,789	19,018
TOTALS	1,157,199	$248,034
MANUFACTURED		
Rubber boots	60	$195
Drug sundries, except syringes and hot water bottles		2,221
Tire casings and tubes, except auto	4	109
Solid tires, auto and truck	10	114
Rubber belting, except auto fan belts	166	226
Latex and other compounded rubber for further manufacture	10,800	4,863
TOTALS		$7,728
GRAND TOTALS, ALL RUBBER REEXPORTS		$255,762

Imports for Consumption of Crude and Manufactured Rubber

	September, 1948	
	Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	110,023,708	$21,480,244
Rubber latex	3,221,569	$13,347
Balata	204,382	67,970
Jelutong or Pontianak	261,095	83,432
Gutta percha	256	66
Chicle	1,915,665	1,327,157
Synthetic rubber	5,381,801	1,056,852
Scrap rubber	1,107,324	26,293
TOTALS	122,315,800	$24,835,361
MANUFACTURED		
Tires: auto, bus, truck no.	199	$4,283
Bicycle no.	440	588
Inner tubes no.	62	114
Rubber footwear:		
Boots prs.	4,099	6,460
Shoes & overshoes prs.	11,312	7,890
Rubber-soled canvas shoes prs.	6,700	2,718
Rubber balls: golf no.	5,364	1,538
Other, except tennis no.	149,583	20,452
Toys, except balloons	.....	781
Hard rubber products	.....	727
Rubber gaskets and valve packing	.....	109
Molded rubber insulators	.....	3
Rubber belting lbs.	68	240
Hose and tubing	.....	254
Heels and soles lbs.	1,000	204
Bands lbs.	300	240
Soft rubber products, except drug sundries	.....	7,154
Other rubber products	.....	323
Synthetic rubber products	.....	1,548
TOTALS	.....	$55,626
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$24,890,978

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Trade Marks

(Continued from page 502)

503,229. **Phildell.** Hose. Quaker Rubber Co., Philadelphia, Pa.

503,234. **Thermoprene.** Transmission belting. Thermoid Co., Trenton, N. J.

503,347. **Visqueen.** Plastic film. Visking Corp., Chicago, Ill.

503,386. **Yale.** Tires and tubes. Pure Oil Co., Chicago, Ill.

503,396. **All Weather.** Tires. Goodyear Tire & Rubber Co., Akron, O.

503,408. **Flexrite.** Tire patches. Paul E. Hawkinson Co., Minneapolis, Minn.

503,409. **Hawkinson.** Tire patches. Paul E. Hawkinson Co., Minneapolis, Minn.

503,413. **Chas. A. Schieren Company.** Belting. Chas. A. Schieren Co., New York, N. Y.

503,417. **NAPCO.** Plastic sheeting. National Products Co., Inc., Sheboygan, Wis.

503,432. **Vix-Syn.** Washers, packings, etc. E. F. Houghton & Co., Philadelphia, Pa.

503,440. **Cornell.** Tires and tubes. The Pep Boys, Manny, Moe & Jack, Philadelphia, Pa.

503,610. **Brighton.** Rain shirts. Hodgman Rubber Co., Framingham, Mass.

503,641. **Danoflex.** Footwear. Danbury Rubber Co., Inc., Danbury, Conn.

503,648. Representation of a rectangle containing the word: **"Pilot,"** Air-filled pillows and cushions. Aircube, Inc. Inc., New York.

503,660. **Li-Lo.** Rain hoods, bathing caps, etc. P. B. Cow & Co., Ltd., London, England.

503,679. Representation of a rough sketch of the outline of a woman contained in a shaded rectangle. Foundation garments. Theo Co., Inc., Jamaica, N. Y.

503,705. **Inter-Polymer.** Acrylic denture base material. Motloid Co., Inc., Chicago, Ill.

503,717. Representation of a key containing the word: **"Waterlox,"** and upon which are two world globes. Waterproofing compound. Empire Varnish Co., Cleveland, O.

503,730. **Peter Bain.** Garters, suspenders, etc. Pioneer Suspender Co., Philadelphia, Pa.

503,752. **Dill.** Tire valves, tire valve stems, washers, etc. Dill Mfg. Co., Cleveland, O.

503,779. **Dumor.** Thermoplastic molding composition. Dumor Plastics, Inc., Atco, N. J.

503,793. **Best-Test.** Rubber cement. Union Rubber & Asbestos Co., Trenton, N. J.

503,834. Representation of an oval containing the word: **"Neverleek."** Raincoats. Cable Raincoat Co., Boston, Mass.

503,878. **Parr.** Insulating tape. Parr Electric Co., Inc., Newark, N. J.

503,881. **Velv-Kut.** Coated abrasive products. Armour & Co., Chicago, Ill.

503,919. **Sterling-L.** Carbon black. Godfrey L. Cabot, Inc., Boston, Mass.

503,920. **Saniseal.** Plastic film. Interchemical Corp., New York, N. Y.

503,921. **Sanilite.** Plastic film. Interchemical Corp., New York, N. Y.

503,946. **Maid-O-The-Mist.** Shower curtains. Bartman & Bixer, Inc., New York, N. Y.

503,990. **Vis-O-Tog.** Tablecloth covers, draperies, etc. A. L. Siegel Co., Inc., New York, N. Y.

504,035. **Self-Seal.** Hot water bottles. Lobl Mfg. Co., Middleboro, Mass.

504,038. **Safe-Trac.** Tires and tubes. Kelly-Springfield Tire Co., Cumberland, Md.

504,043. **Steadifeed The Nipple That "Breathes."** Nursing nipples. H. J. Searer, doing business as Searer Rubber Co., Akron, O.

504,067. **Peter Bain.** Garters, suspenders, etc. Pioneer Suspender Co., Philadelphia, Pa.

504,068. **Peter Bain by Pioneer.** Garters, suspenders, etc. Pioneer Suspender Co., Philadelphia, Pa.

504,072. Representation of a circle upon which is a parallelogram containing the word: **"Seminex."** Carbon black. Jefferson Lake Sulphur Co., Inc., Houston, Tex.

504,077. **Roth Creations.** Foundation garments. Royal Worcester Corset Co., Worcester, Mass.

504,082. **ES ES** Plastic trays. United States Rubber Co., New York, N. Y.

504,111. **Ball-Band.** Footwear. Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.

504,115. **Katherine-K.** Foundation garments. Kellogg Corset Co., Jackson, Mich.

504,118. **Joyce.** Footwear. Joyce, Inc., Pasadena, Calif.

504,125. Representation of an Indian standing on a shoe and containing the words: **"Indian Trail."** Footwear. Foot Form Shoe Shops, Inc., New York, N. Y.

United States Rubber Statistics—September, 1948

(All Figures, in Long Tons, Dry Weight)

	New Supply			Distribution		
	Production	Imports	Total	Consumption	Exports	Stocks
Natural rubber, total	0	49,118	49,118	49,968	514	113,089
Natural latex, total	0	1,438	1,438	2,163	0	10,823
Natural rubber and latex, total	0	50,556	50,556	52,131	514	123,912
Synthetic rubber, total	†35,791	2,403	40,293	39,215	628	98,270
	‡ 2,099					
GR-S	†30,910	1,057	32,444	30,021	428	§84,342
	‡ 477					
Butyl	† 2,543	1,346	3,889	5,114	Below 0.5	6,541
Neoprene	† 2,338	0	3,047	3,342	183	4,086
	‡ 709					
Nitrile	† 913	0	913	738	17	2,401
Natural rubber and latex, and synthetic rubber, total	37,890	52,959	90,849	91,346	1,142	222,182
Reclaimed rubber, total	21,805	0	21,805	23,478	740	30,198
GRAND TOTALS	59,695	52,959	112,654	114,724	1,882	252,380

†Government plant production.
‡Private plant production.
§Includes 24 tons shipped for export, but not cleared.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

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United States Rubber Industry Employment, Wages, Hours

	Prod. Workers 1000's	Prod. Workers Index	Prod. Workers Payroll Index	Ave. Weekly Earnings	Ave. Weekly Hours	Avg. Hourly Earnings	Consumers Price Index
All Rubber Products							
1939	121	100.0	100.0	$27.84	36.9	$0.754	99.4
1943	194	160.3	263.9	.....	.....	.....	133.5
1947							159.2
Sept.	203	168.4	348.3	57.76	39.9	1.447	163.8
Oct.	208	171.7	354.4	57.62	40.1	1.438	163.8
Nov.	210	174.0	361.4	57.99	39.9	1.454	164.9
Dec.	212	175.3	373.6	59.47	40.9	1.454	167.0
1948							
Jan.	210	173.5	354.9	57.33	39.7	1.444	168.8
Feb.	208	172.6	337.2	54.70	38.5	1.421	167.5
Mar.	204	168.9	320.6	53.24	37.8	1.408	166.9
Apr.	198	163.8	312.8	53.39	37.8	1.412	169.3
May	195	161.1	318.9	55.45	39.0	1.424	170.5
June	195	161.6	330.2	57.14	39.7	1.439	171.7
July	191	157.7	329.7	58.37	39.7	1.472	173.7
Aug.	195	160.9	347.2	60.54	40.3	1.502	174.5
Tires and Tubes							
1939	54.2	100.0	100.0	$33.36	35.0	$0.957	
1943	90.1	166.1	265.7	.....	.....	.....	
1947							
a Sept.	100.5	185.2	355.3	64.75	38.9	1.661	
Oct.	102.0	188.0	354.7	63.78	38.7	1.647	
Nov.	102.4	188.7	362.4	64.86	38.9	1.661	
Dec.	101.9	187.8	365.6	65.74	39.5	1.658	
1948							
Jan.	100.6	185.5	344.4	62.72	38.2	1.646	
Feb.	98.9	182.4	315.4	58.22	36.0	1.613	
Mar.	96.4	177.7	292.4	55.54	34.8	1.599	
Apr.	92.6	170.7	286.4	56.54	35.3	1.603	
May	91.4	168.5	305.7	61.15	37.4	1.636	
June	91.9	169.4	322.0	63.96	38.8	1.651	
July	90.9	167.6	329.8	66.30	39.3	1.684	
Aug.	91.5	168.7	341.0	68.30	39.5	1.730	
Boots and Shoes							
1939	14.8	100.0	100.0	$22.80	37.5	$0.607	
1943	23.8	160.5	268.8	.....	.....	.....	
1947							
Sept.	21.0	141.6	314.4	49.92	41.8	1.183	
Oct.	21.7	146.1	331.7	51.28	42.4	1.211	
Nov.	22.0	147.9	322.4	49.26	40.6	1.213	
Dec.	22.5	151.4	367.1	54.72	44.5	1.231	
1948							
Jan.	22.5	151.5	342.8	51.08	42.1	1.214	
Feb.	22.8	153.8	345.0	50.65	41.7	1.214	
Mar.	22.6	152.4	347.0	51.42	42.2	1.219	
Apr.	22.1	149.0	333.9	50.59	41.7	1.214	
May	21.7	146.4	328.1	50.61	41.7	1.214	
June	21.8	146.9	329.7	50.69	41.7	1.215	
July	20.7	139.4	321.7	52.12	42.3	1.231	
Aug.	22.0	148.3	344.1	52.53	41.5	1.266	
Other Rubber Products							
1939	51.9	100.0	100.0	$23.34	38.9	$0.605	
1943	79.9	154.1	255.8	.....	.....	.....	
1947							
Sept.	81.9	157.8	338.3	50.40	40.9	1.234	
Oct.	84.0	162.0	352.3	51.03	41.4	1.232	
Nov.	86.1	166.0	362.2	51.27	41.0	1.252	
Dec.	87.7	169.1	379.9	52.93	41.8	1.261	
1948							
Jan.	86.8	167.4	368.3	51.79	41.1	1.260	
Feb.	86.5	166.9	366.2	51.33	40.8	1.258	
Mar.	85.7	165.3	356.2	50.60	40.4	1.251	
Apr.	84.0	161.9	347.1	50.16	39.9	1.256	
May	81.7	157.5	337.7	50.34	40.0	1.260	
June	81.7	157.5	343.7	51.15	40.2	1.272	
July	79.2	152.7	331.9	51.07	39.4	1.296	
Aug.	81.0	156.3	358.3	53.71	40.9	1.319	

SOURCE: BLS, United States Department of Labor, Washington, D. C.

Symposium on Industrial Fabrics

A SYMPOSIUM on industrial fabrics will be featured at the Akron Rubber Group meeting, February 18, Mayflower Hotel, Akron, O. Principal speakers will be Warren E. Busse, technical director, Institute of Textile Technology, who will deal with "Cotton as a Raw Material for Industrial Fabrics," and H. C. Froehling, development manager, rayon technical division, E. I. du Pont de Nemours & Co., Inc., who will discuss "Synthetic Fibers in Industrial Uses," with emphasis on rayon and nylon. Also, a panel of experts will consider problems on the application of fabrics to rubber; E. M. Penny, Owens-Corning Fiberglas Corp.; A. H. Burkholder, Industrial Rayon Corp.; K. D. Smith, National-Standard Co.; H. S. Grew, Jr., Wellington-Sears Co.; and H. B. Shearer and A. B. Baker, both of American Viscose Corp. The technical session will be followed by a social hour, dinner, and a talk by Larry F. Livingston, manager of extension division, du Pont, on "Preview of Progress."

United States Production and Sales of Rubber-Processing Chemicals in 1947

Preliminary statistics on domestic production and sales of rubber-processing chemicals have been released by the United States Tariff Commission. The figures cover materials used in the compounding of natural and synthetic rubbers, but do not include those which are basic components of synthetic rubbers.

The total 1947 production of rubber chemicals of 100,722,000 pounds was 5% above the 1946 output and less than 1% below the peak output of 101,000,000 pounds in 1945. Sales in 1947 were 89 million pounds, valued at $43 million, as compared with 87 million pounds, valued at $40 million, in 1946. The output of cyclic rubber chemicals in 1947 increased 7% over that reported for 1946; while production of acyclic chemicals decreased 4% in 1947, compared with 1946.

	Production 1,000 Lbs.	Sales Quantity 1,000 Lbs	Sales Value $1,000s	Sales Unit Value per Lb.
CYCLIC CHEMICALS				
Accelerators, total	48,033	37,554	14,667	$0.39
Aldehyde-ammies, total	1,175	1,038	736	.71
n-Butyraldehyde-aniline	377	333	194	.58
All other	798	705	542	.77
Dithiocarbamates	278	303	336	1.11
Guanidines, total	5,336	4,804	1,981	.41
Diphenylguanidine	4,158	3,687	1,373	.37
All other	1,178	1,117	608	.54
Thiazole derviatives, total	41,244	31,409	11,614	.37
2, 2'-Benzothiazyl disulfide	12,365	10,839	3,732	.34
2-Mercaptobenzothiazole	17,732	9,639	2,905	.30
Zinc salt of 2-mercaptobenzothiazole	1,239	1,096	309	.28
All other	9,908	9,835	4,668	.47
Antioxidants, total	37,797	36,799	16,341	.44
Amino or hydroxy compounds, total	21,231	21,074	9,884	.47
N, N'-Diphenyl-p-phenylenediamine	3,397	3,360	2,280	.68
All other	17,834	17,714	7,604	.43
All other antioxidants[1]	16,566	15,725	6,457	.41
TOTALS	85,830	74,353	31,008	.42
ACYCLIC CHEMICALS				
Accelerators, total	4,441	4,424	4,919	1.11
Dithiocarbamates, total[2]	807	674	748	1.16
Dibutyl dithiocarbamic acid, zinc salt	262	186	199	1.07
All other	545	488	549	1.12
Thiurams[3]	3,448	3,587	3,991	1.11
All other accelerators	186	163	180	1.10
Other chemicals, total	10,451	9,801	6,675	.68
Peptizers: dodecyl mercaptan	6,297	6,128	4,781	.78
All other	4,154	3,673	1,894	.51
TOTALS	14,892	14,225	11,594	.81
GRAND TOTALS, ALL RUBBER-PROCESSING CHEMICALS	100,722	88,578	42,602	.48

[1] Includes data on production and sales of rubber-processing chemicals for other uses in order to render statistics publishable.
[2] The dithiocarbamates, for which statistics are shown in this table, are used entirely as rubber-processing chemicals. Data on the dithiocarbamates which are used almost entirely as fungicides are not shown here.
[3] Includes data on thiurams reported for agricultural uses.

Colloid Equipment Co.'s New Whiz-Mixer

Laboratory Mixer

THE Whiz-Mixer, a new mixer for use in the laboratory or home, has been announced by Colloid Equipment Co., Inc., New York, N. Y. This mixer can be used to emulsify, macerate, or disperse materials and is claimed to do in 15 minutes what requires eight to 24 hours in a standard ball mill. The machine is also said to make dispersions and emulsions within minutes, as compared with hours required in ordinary mixing.

The mixer has a streamlined design, with non-tipping chrome-plated base and rubber suction table rests. Other features include an air-cooled two-speed 1/5-h.p. motor; durable, non-tarnishable, non-breakable, acid-resistant stainless steel bowl and cover of one-quart capacity; stainless-steel cutting and mixing knives; and graphited, oilless bronze bearings. The mixer has an overall height of 14 inches, a 6-¾-inch base diameter, and weighs eight pounds.

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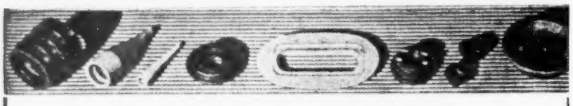

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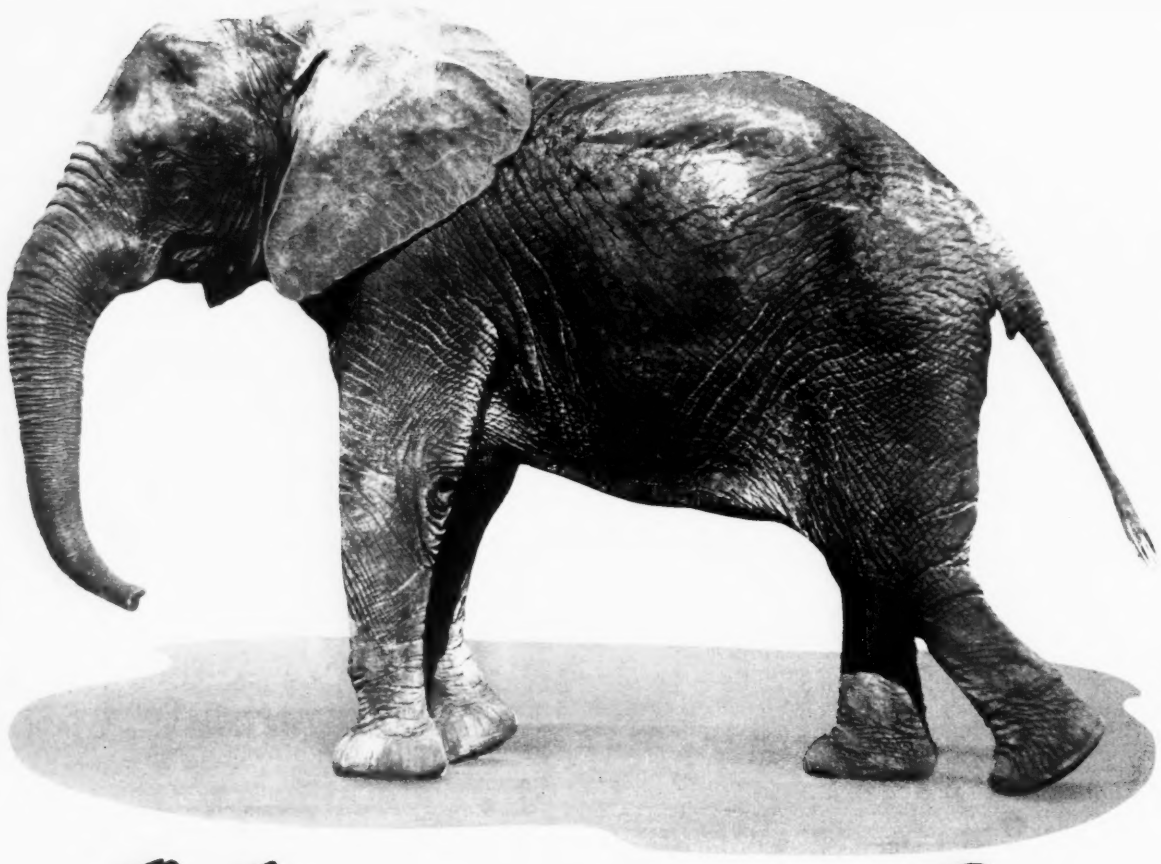

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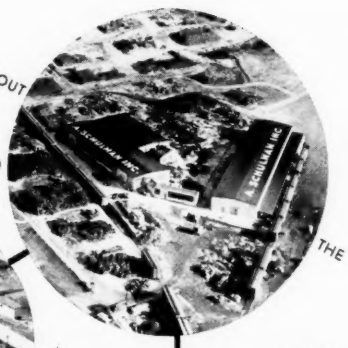

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